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The Fixation of Atmospheric Nitrogen

How, Utilizing German Experience, the United States May Provide a Nitric Acid Supply for War, Agriculture and Industrial Arts

BY ROBERT G. SKERRETT

The World War has brought home to all the nations with startling force the part that nitrogen plays in every department of life. It has shown how vitally necessary is a sufficiency of nitrogen in the waging of war, and no less has it made plain how much this element is needed in drawing from the soil the food for a hungering populace. In many of the industries nitrogen figures importantly, and well may any country ask: What could we do if our ordinary source of supply were cut off?

This supply Nature placed down on the slopes of the Andean foothills, and from the nitrate beds of Chile the world has been taking for forty-odd years a continually increasing toll. Experts declare that these deposits of fixed nitrogen are steadily approaching exhaustion and that in all probability half a century hence South America will no longer be able to furnish saltpeter. And even before this day arrives, the Chilean authorities will, undoubtedly, not only restrict the exportation of native sodium nitrate but will mark the price higher year by year. Unless the world can secure plenty of nitrogen in some suitable fixed form meanwhile, the cost of living will soar and many industries will be hard put to it to carry on their activities.

A Group of Birkeland-Eyde Arc Furnaces at Notodden, Norway. It is in these that the nitrogen and oxygen are converted into nitric oxide

Tops of Granite Towers Used in the Arc Process at Notodden. The piping distributes the spray, which falls upon the ascending gas

Some months ago (Sept. 30, 1915), THE IRON AGE published an article dealing with the properties and uses of military explosives. Every one of them calls for nitrogen in some form, i.e., saltpeter, ammonium nitrate or nitric acid. The bulk of these chemicals has been produced from Chilean nitrate. In brief, guns would be silenced; bursting shell would be impotent; land and submarine mines would be dead; and the dire torpedo would be without its devastating sting but for the powders and bursting charges made possible by nitrogen in some form. Now we know why our naval and military authorities have urged Congress to give them the funds for creating a reserve supply of Chilean nitrate. For the army, Brig.-Gen. William M. Crozier has asked for a store of 65,000,000 lb. of the material.

It is not generally known, but at the outbreak of war Germany had within her boundaries something like 1,300,000,000 lb.—650,000 tons—of sodium nitrate from South America, most of which had been imported primarily for the manufacture of fertilizers. But with her trade routes closed to her, Germany quickly realized that she could not get any more saltpeter from Chile, and all of the supply at home was immediately commandeered for military purposes. Her use of explosives to-day, estimated upon the basis of current prices here, is at the rate of $1,000,000 every 24 hr. Even with an initial stock of nitrate worth $30,000,000 Germany could not have kept up the struggle as she has without more nitrogen. With imports cut off, Germany's scientists have developed efficient methods for the fixation of atmospheric nitrogen, and under the stress of conflict an infant industry has attained the proportions of maturity.

Before the first of August of 1914, Germany had three electrochemical establishments engaged in the fixation of free or atmospheric nitrogen,

but the total output still left it necessary for the empire to draw from Chile hundreds of thousands of tons of sodium nitrate annually. Indeed, Germany was by long odds Chile's biggest customer. She needed more than other nations because her lands are not particularly fertile and it has been by artificial stimulation of her soil that she has been able to feed her relatively dense population. What she did in a comparatively modest way in drawing upon the atmosphere for nitrogen before the beginning of hostilities, she has had to increase enormously since, and what Germany has done is of the utmost significance to us, because naval experts frankly declare that we could not keep the trade routes to Chile clear in time of war. Therefore, we should not count upon the nitrate beds there. In other words, we must find means within our own gates to draw from the air and fix enough nitrogen for manifold purposes and enormous demands.

The air is an inexhaustible storehouse of nitrogen. Measured by volume, 78 per cent of our enveloping atmosphere is nitrogen, and upon every square yard of the earth's surface there rests a column of air containing 5.8 tons of nitrogen in the free elementary state. Could all of the nitrogen in the atmosphere above one square mile of land, a matter of 20,000,000 tons, be extracted and "fixed," it would suffice the world's needs for half a century! By the world's needs, are meant civilization's requirements in agriculture and manufacturing industries. This limitation must be borne in mind, because Nature has a way of restoring to the soil the nitrogen needed to sustain normal vegetation but by no means enough to meet the hunger of exhausting crops raised season after season upon the same ground. By electric action in the air 100,000,000 tons of combined nitrogen, in the form of nitric acid and nitrates, are fixed and then restored to the soil by descending rains.

Metal Cars Filled With Calcium Carbide as It Issues from the Electric Furnaces

ARC PROCESS PRACTISED IN SCANDINAVIA

This has been the key for the arc process which is to-day quite extensively employed in Norway and Sweden and upon the slopes of the Alps in the fixation of atmospheric nitrogen. The intense heat of the arc simulates the electric action of the sky, and brings about a union between the molecules of oxygen and the molecules of nitrogen where ordinarily they are neighbors and not kin. That is to say, in the presence of a temperature of 5432 deg. Fahr., one molecule of oxygen unites with one molecule of nitrogen and together form two molecules of nitric oxide, a colorless gas. From the electric furnace the nitric oxide passes at a temperature of 1382 deg. Fahr. into that part of the apparatus where, at a temperature of 1148 deg. Fahr., it unites readily with free oxygen, and forms nitrogen peroxide, a brown gas. The nitrogen peroxide is now ready to undergo its final change into nitric acid—the immediate aim of the arc process.

By means of powerful ventilators the nitrogen peroxide is drawn from the oxidation chambers into great absorption towers of Norwegian granite. Such are the towers at Notodden, Norway, where the well-known Birkeland-Eyde process is employed. These towers are filled with fragments of quartz and at the top of a spraying arrangement which makes it possible to imitate falling rain. The gas enters each tower from the bottom and actually passes through three of them before the cycle is completed. The spray that falls ranges from fresh water to more or less dilute nitric acid, depending upon the tower, and as it trickles downward over the quartz it offers a vast surface of liquid for the absorption of the nitric vapors from the ascending gas. By repeating these processes the nitric acid is gradually concentrated until it has a strength of 50 per cent. By means of the Pauling arc process a higher percentage of nitration is obtainable; in fact, 98 per cent nitric acid can be secured by this method. For a number of important purposes, such as the manufacture of nitroglycerin, an acid of over 90 per cent is required, while for other purposes an acid of at least 60 per cent is needed. Of course, heat is required for this concentration, and heat means an outlay in energy.

Dr. Thomas H. Norton of the Department of Commerce, who visited the Scandinavian plants engaged in the fixation of atmospheric nitrogen, has said: "I was informed by the engineers in charge of the Norwegian factories that only 3 per cent of the heat evolved by the electric current passing through a furnace is exerted in effecting the chemical combination (the combination of the nitrogen and oxygen). Of the other 97 per cent, in the case of the Schoenherr furnace, 40 per cent is absorbed by the water employed to cool the upper part of the reaction tube, 17 per cent is lost by radiation, 30 per cent is recovered in the boilers traversed by the gas current, and 10 per cent is surrendered to the cooling tube between the boilers and the oxidation chamber."

This makes it evident that only where a cheap source of power prevails is it possible to manufacture nitric acid direct by the arc process. In Scandinavia the cost per horse-power-year ranges from $1.96 to $2.94 at favored places. In Germany there is no such cheap water power, but just the same Germany has found a way to fix atmospheric nitrogen upon a cost basis that bids fair to make her independent of Chile in the course of a decade. Indeed, her experts declare that she will be in this position by 1922.

COMBINING FREE NITROGEN WITH CARBIDE

Back in the nineties Doctors Frank and Caro, prominent German chemists, were engaged in the manufacture of cyanides, then of increasing importance in the extraction of gold from low-grade ores. They used barium in the preparation of their carbide, but the Boer War interrupted mining in South Africa and, incidentally, caused a slump in the price of cyanides. The problem was to find a cheaper carbide which, in the presence of nitrogen, could be changed into cyanide. In the course of their experiments, the company, working under the Frank and Caro patent, tried calcium carbide, being produced at the time for the generation of acetylene gas. This carbide, when heated in an electric oven in the presence of nitrogen, was not transformed into cyanide, but, instead, was changed into an entirely new product—calcium cyanamid—which had distinctive properties of its own, thanks to the stored or fixed nitrogen carried by the modified carbide. In 1901, one of Dr. Frank's co-workers, H. Freudenberg, established the fact that calcium cyanamid could be used as a fertilizer, and the original cyanide industry of modest promise had opened up for it in the making of cyanamid an enormous field of usefulness in turning out nitrogenous fertilizer.

The raw materials needful are coke and lime and nitrogen extracted from the air, and, according to competent authorities, the cyanamid process is a good deal more economical than the fixation of nitrogen by the arc process. To quote Dr. Norton again: "At present 1 kw.-hr. yields 17 grams of nitrogen in the form of nitric acid by the union of atmospheric nitrogen and oxygen under the most favorable technical conditions; it yields 70 g. in the form of calcium cyanamid from nitrogen, coal and lime." And we shall see presently that this cyanamid can be made to yield ammonia and the ammonia can be turned into nitric acid, if the latter be desired, at a lower ultimate cost than the same acid can be produced primarily by the electric arc. This is because the consumption of energy is a lower one in the making of cyanamid, and the greatest amount of current is needed only for the production of the initial calcium carbide.

The calcium carbide, made by fusing coke and lime in an electric furnace, is then ground fine enough to pass through a 100-mesh screen. This increases the surface for the absorption of nitrogen. The next raw material is pure nitrogen, and at the American Cyanamid Company's plant, on the Canadian side at Niagara Falls, this is obtained by means of liquid air machines and recourse to fractional distillation. The establishment in question has the biggest liquid air plant in operation anywhere, and is able to turn out 2,000,000 cu. ft. of practically pure nitrogen daily. The liquid air machinery supplants the older method of passing air over heated copper for the isolation of nitrogen. At something like 300 deg. below zero the liquid air gives off its nitrogen and holds in solution the heavier oxygen. Thus the nitrogen is caught and separated and made ready to be fed to the electric ovens in which is placed the ground calcium carbide.

There are whole batteries of electric ovens, each having a capacity of ½ to 2½ tons of carbide. At the proper temperature, somewhere below 2400 deg. Fahr., the ground carbide is baked and, at the same time, is induced to absorb the nitrogen. This operation covers a period of 30 to 40 hr. At the end of that time the product of the ovens is a hard black cake, analyzing 22 per cent nitrogen and about 1 per cent un-nitrified carbide. In the trade, this material is called lime nitrogen, and is next finally ground and is ready to be used either for fertilizer or to be employed in the manufacture of ammonia and thence into nitric acid. If it is to be used for agricultural purposes the material is partly hydrated to insure the decomposition of its small percentage of carbide, next it is oiled to make it dustless and then stored in bulk or packed ready for shipment to be mixed in fertilizing compounds.

To make the calcium cyanamid give up all of its nitrogen in the form of ammonia, it has only to be treated with superheated steam. If desired, the liberated ammonia may be absorbed in sulphuric acid, and this provides a very pure ammonium sulphate which is an ideal ingredient for plant foods. The ammonia can also be transformed into ammonium nitrate. This is a prime constituent in the manufacture of certain blasting powders or compounds, especially of the so-called lifting explosive types. These constitute the greater part of the charges used in mines and countermines and other explosives employed in trench warfare by the European belligerents.

Electric Furnaces at the American Cyanamid Plant. Ground carbide and pure nitrogen are brought together and calcium cyanamid formed

It is the cyanamid process that Germany has turned to. Lacking the water power of Norway, Germany has been able to turn to her inexhaustible deposits of brown coal or lignite, and with this fuel, used mainly at the pit mouth, she has found it practicable to generate through steam the electrical energy required first in the making of calcium carbide and then for the conversion of that carbide, in the presence of nitrogen, into calcium cyanamid through the agency of the electric oven. Despite the fact that her unit of energy costs her considerably more than that furnished by the waters of Scandinavia, still the ultimate product by the arc process and using water power costs more than that turned out by the cyanamid process where coal is the initial source of energy.

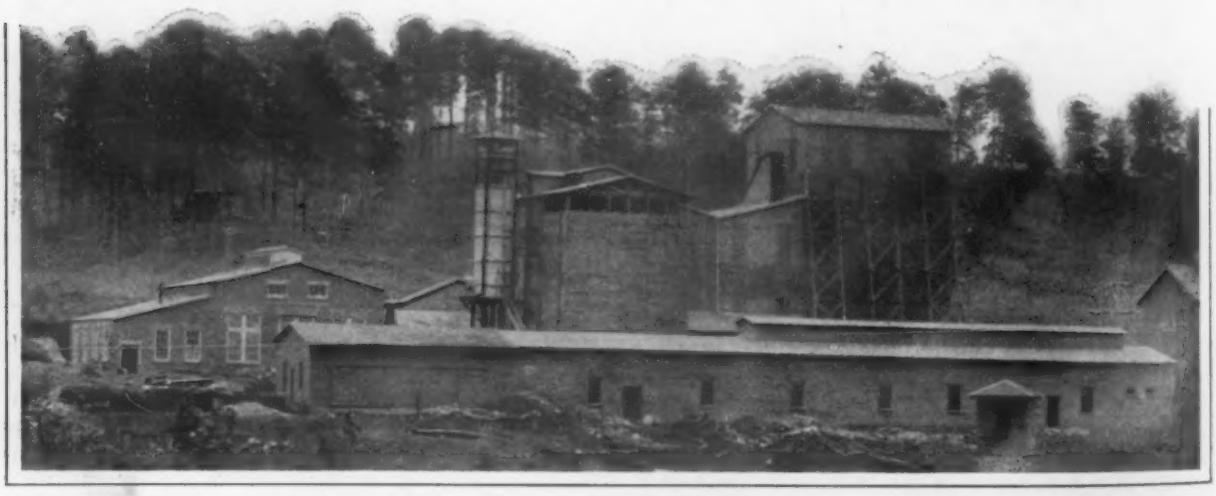
GOVERNMENT MUST FOSTER CYANAMID INDUSTRY

Cyanamid can be manufactured anywhere within our boundaries where there is water power that can be developed cheaply and which can be reached by rail. Again, it is not unlikely that certain of our coal fields might furnish power on the spot at low enough price to warrant placing plants there. This might be practicable by coking the coal and using the gases for the operation of prime movers and the coke for the making of calcium carbide. At the outset we could not expect to compete with Chilean nitrate. However, the Government must come to the rescue of the industry, no matter what the process, and at least make it possible for manufacturers to have available an abundance of cheap water power.

For those interested in initial outlays, it is said that there is no comparison between the first cost of a cyanamid plant and an arc plant, if power development be included. The cyanamid plant, per unit of nitrogen fixed, calls for an investment of something like one-fourth that required in the case of the arc process. Inasmuch as electrical power is relatively expensive in the United States, the cyanamid process would seem to be the solution of the economic problem of providing us with a supply of nitric acid as well as with nitrogenous fertilizers if Chilean saltpeter be denied us. The stress of war has compelled Germany to develop her internal resources and to create for their protection an imperial nitrogen monopoly. There is a lesson for us in this, because the demands for nitrogenous products will steadily increase and be vast even in time of peace. We must provide against the future that holds the exhaustion of the Chilean beds of sodium nitrate.

Cyanamid can be transformed into urea. We import annually quite $50,000 worth of this for use in one industry alone, the making of celluloid. Cyanamid can be converted into dicyanamid, simply by treating it with hot water. This can be used as a deterrent in explosives and tends to lower the development of heat, thereby lessening the wear and tear upon the rifling of weapons. Cyanamid has been made to produce creatine, and in this we see the promise of the synthetic production of foods. For the manufacture of certain synthetic medicines and dyes and photographic chemicals from coal tar the nitric acid that can be furnished by cyanamid will supplant that obtained through the treatment of Chilean saltpeter. To the metallurgical industry, however, cyanamid has already proved extremely effective as a case hardening material—used under the name carbonite. There is a crude form of cyanide, derived from cyanamid and known as surronide, which may also be used as a case hardening material, though not exactly in the same way as pure cyanide is employed. Cyanide and ferrocyanides are obtained cheaply from surronide, and both of these are much in demand abroad in the case hardening industry.

American enterprise has created a plant at Nitrolee, S. C., where nitric acid is produced by the arc process and after the Pauling patents. Power is furnished by hydroelectric energy, and the product is on the market to-day. But even with the advantage of water power it would be commercially impracticable to make acid for sale at the normal price of 4 cents and less. To-day, nitric acid is selling at 6 cents per pound, and this fact alone gives the arc process a chance here.



Nitric Acid Plant of a Subsidiary of the Southern Power Company, at Nitrolee, S. C. The arc process for the fixation of atmospheric nitrogen is employed

Barb Wire Exports at New Record Rates

Exports of barb wire from this country continue at an enormous rate, the average for August, September and October, 1915, being 24,448 gross tons per month, or at the rate of 293,336 tons per year. The comparative exports are as follows:

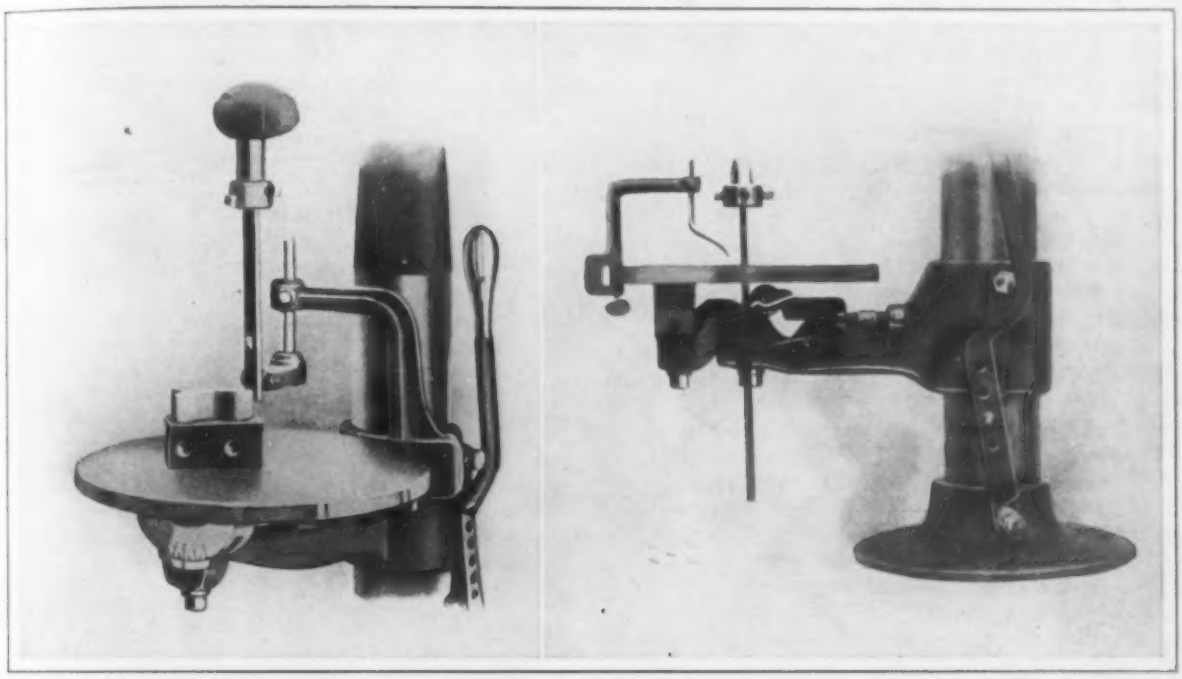
	Gross Tons	Gross Tons per Month
August, 1915	20,597	
September, 1915	32,827	24,448
October, 1915	19,920	
Ten months ended Oct. 31, 1915	192,806	19,280
Fiscal year ended June 30, 1915	147,591	12,299
Fiscal year ended June 30, 1912	103,100	8,600

The present monthly rate of exports is therefore about three times that of the fiscal year 1912. Total exports of barb and all other wire are also expanding, the average for August, September and October, 1915, being 45,498 tons per month and to Nov. 1, 1915, 377,742 tons, or 37,774 tons per month. These figures compare with 244,077 tons for the fiscal year 1912, or 20,340 tons per month, which was the previous record.

The Midvale Steel Company has opened an office at Cleveland, Ohio, at 1217 Swetland Building, for the sale of its bar steel products in the Cleveland district. The company has leased a warehouse on Kinsman Road and the Nickel Plate track providing about 10,000 sq. ft. of floor space in which it will carry a stock of bar steel. S. W. Norwood, who has been connected with the company for a number of years, and was until recently located in San Francisco, is manager of the Cleveland office.

Bench Filing and Hack Saw Machine

As a substitute for hand filing and drill work, such as required in making dies and other particular machine work, the Extensive Mfg. Company, 90 West Street, New York City, has placed on the market a combination bench filing and metal hack saw machine. While the machine is designed primarily for die work, it can also be used for filing gages and templates, light slotting, finishing cutlery, trimming sprues and gates from castings and fins from drop forgings and for finishing parts for guns, typewriters, sewing machines, lighting fixtures, etc. One of the points upon which special emphasis is laid is that the line to which work is being done is not hidden as the cutting is done on the down stroke and the line is under the eye of the operator instead of being at the side as in hand filing.



A Bench Filing and Hack Saw Machine in Which the File Is Supported by a Roll under the Table That Is Adjusted by a Lever

The machine is designed so that when the base is bolted to the top of a work bench practically the full diameter of the table overhangs the edge and the driving shaft is at the top of the machine, thus it is pointed out keeping the bench free from belts and countershafts. It is possible to adjust the table either to the right or left, or forward or backward to provide for practically any angle, this adjustment being controlled by a single nut, with graduated plates on the table supports showing the angle to which the table is adjusted at a glance. It is also possible to adjust the elevation of the table for different lengths of files or changes in the stroke. A handle bolted to the base of the machine, as shown in the right portion of the accompanying engraving, and attached to the work table support enables the operator by pushing the handle backward to lower the table and remove the work from the machine without changing the position of the file or the roller guiding it.

The driving shaft at the top of the machine drives either the file or the saw in a vertical position, the cutting being acomplished on the down stroke while the return is accomplished at a higher rate of speed. In this way, it is emphasized, the motions used in hand filing are exactly imitated and it is possible to secure a greater number of cuts per minute without increasing the surface cutting speed of the file beyond the point of endurance. The range of stroke can be varied from 0 to 6 in. by loosening the nut on the crankpin and moving the latter toward or away from the center of the disk on the end of the driving shaft. The connecting rod is pivoted on the frame of the machine and also has a pivot connection with the top of the saw frame. The file guide roller, also shown in the right portion of the engraving, is made of soft steel and has a right and left screw to provide an adjustment for accommodating different thicknesses and shapes of files. When a saw is employed a guide roller of hardened steel is substituted.

For use when small circles are being filed or sawed, or when the saw has a tendency to lift the work on the return stroke, a holddown, consisting of a steel finger projecting in front of the file, is employed. This can be attached to any part of the work table edge and is adjustable for any thickness of work up to 3 in. Two of these attachments are provided for each machine, and when sawing is being done it is recommended that one be adjusted close to each side of the saw on a line with the front edge of the saw teeth. Emphasis is laid upon the fact that it is not necessary to remove the attachment when work is being placed on or taken from the table.

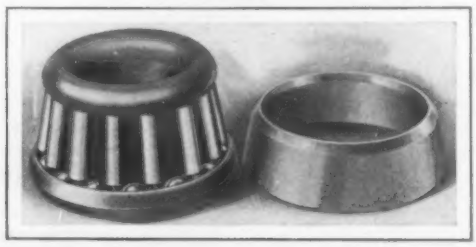
The punch filing attachment, shown at the left of the engraving, is designed for fitting work on blanking punches when they are being filed to fit a die. It consists of an auxiliary guide roller supported by an adjustable bracket clamped to the edge of the table as shown. When this attachment is being used it is recommended that the table be adjusted very low and a 5-in. file used. The stroke should be made as long as possible without having the file entirely clear of the work on the return stroke.

In use a die has been made on this machine in 18 min., which when made in the old way of drilling out required 50 min.

The Strong, Carlisle & Hammond Company, Cleveland, Ohio, machinery dealer and manufacturer, recently distributed among its 250 employees a bonus of 5 per cent of their year's salary.

A Combination Ball and Roller Bearing

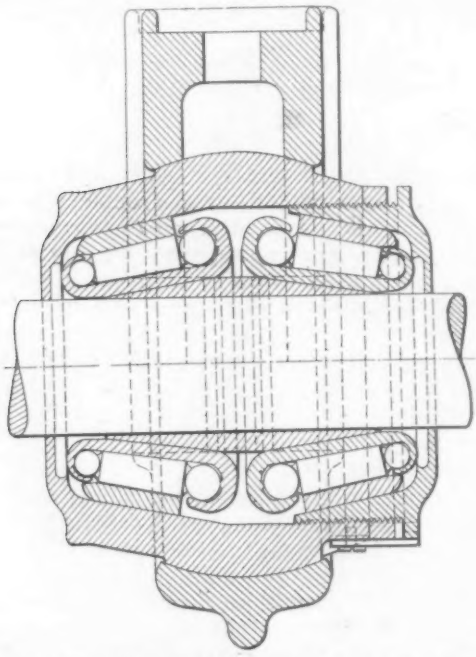
The George Automatic Roller Bearing Company, Winton Place, Cincinnati, Ohio, has placed on the market a roller bearing combining new features of construction. These include the use of balls and



New Type of Bearing Employing Taper Rollers Running on Steel Balls with the Cover Removed to Show the Arrangement

rollers to take care automatically of variations in the diameter of the rollers due to unavoidable inaccuracies consistent with manufacture on a commercial basis. It is described as a roller bearing of a type capable of carrying 50 per cent of end thrust in which the rollers are kept in alignment by ball separators at each end of the rollers.

A general view of the bearing, which will bring out the basic principles of its construction, is presented in the accompanying halftone. The balls are placed in the bearing in two rows to decrease the frictional resistance of the bearing and to allow for the automatic adjustment of the rollers. It is claimed that concentricity of the bearing itself as well as of the bearing upon its mounting and in its housing is secured without compelling very close and necessarily expensive limits in machining. Provision has been made for mounting and dismounting the bearing with facility, so that it may be taken



A Sectional Elevation of a Lineshaft Hanger Equipped with Two of These Bearings

apart for inspection and cleaning without the use of tools or the distortion of any parts.

The basic principles of the taper roller bearing are not new, but where this bearing differs from known types of taper roller bearings, it is pointed out, is in the automatic adjustment of each individual roller which is accomplished by the lateral freedom of each roller controlled by the balls at each end of it, this being accomplished in this way: When the bearings are mounted and tightened in place there is a wedging action on the rollers, but as soon as the bearing has made a half turn the large rollers tend to creep toward the large end of the bearing, owing to the pressure upon them, thus forcing the balls in contact further apart. The small rollers are thereby forced toward the smaller end of the bearing until the working diameters of all the rollers at any section of the cup and cone are equal. All roller or ball bearings require a separating vehicle or medium to prevent the rollers or balls coming in contact, which produces additional friction. In this particular bearing balls are used for this purpose.

Free Lectures in New York on Military Engineering

A course of seven lectures on military engineering is to be given at the Engineering Societies Building, 29 West Thirty-ninth Street, New York City, under the auspices of a committee representing four national engineering societies. The lectures will be given on Monday evenings consecutively, beginning Feb. 14, under the general direction of Major-Gen. Leonard Wood. While the lectures have been arranged for the American Society of Civil Engineers, the American Institute of Mining Engineers, the American Society of Mechanical Engineers and the American Institute of Electrical Engineers, the lectures are open to all engineers whether they are members of the societies mentioned or not.

It is probable that in any special camp which may be formed this summer, like that at Plattsburg, N. Y., last year, an engineer battalion may be formed, as the nucleus of an engineer reserve. This movement is independent of the lecture course, though the latter has been conceived with the idea that it would help preparing civilian engineers in case the necessity should arise for immediate construction of coast and other defenses.

The list of lectures is as follows:

Feb. 14: Organization and duties of engineers in war, and what engineers in civil life will be called upon to do in the defense of the United States, by Capt. Thomas M. Robins, Corps of Engineers, U. S. A.

Feb. 21: The service of reconnaissance, including surveying, mapping and sketching, photography and map production, by Capt. Richard T. Coiner, Corps of Engineers, U. S. A.

Feb. 28: Field fortifications, sieges and demolitions, by Captain Robins.

March 6: Seacoast defenses and battle field illuminations, by Capt. Edward D. Ardery, Corps of Engineers, U. S. A.

March 13: The construction, maintenance and repair of roads, bridges and ferries; the selection and preparation of fords, by Captain Robins.

March 20: The selection, laying out and preparation of camps and cantonments; the service of general construction; and the special services, including all public work of an engineering nature which may be required in a territory under military control, by Captain Coiner.

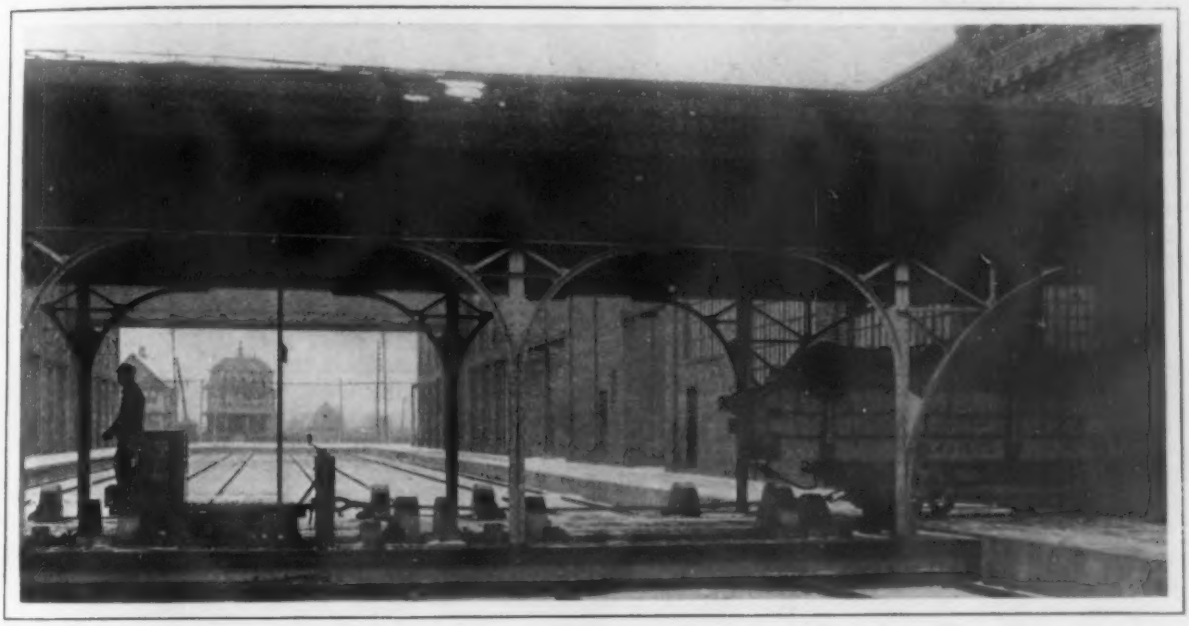
March 27: The construction, maintenance and operation of railways under military control, and the construction and operation of armored trains, by Captain Robins.

For the first three days of last week an increase of 50 per cent in applications for first naturalization papers, as compared with normal business, was reported by the authorities in Detroit. The announcement to 12,300 employees of the Packard Motor Car Company that promotion in that organization will be given only to American citizens or to those who have signified their intention of becoming citizens was posted Monday, Jan. 31. A feeling in sympathy with the announcement is reported in other shops at Detroit, and according to foremen at the Packard works the policy has been generally approved by the workmen. There is no intention to discharge any one who is not a citizen.

After being closed for several years, the Perry forge, Marysville, Perry County, Pa., of which Seidel Brothers are proprietors, resumes operations this week. The product is charcoal-iron blooms for boiler tubes.

Worm-Driven Electric Shop Truck

A storage battery truck with a worm and worm gear drive for which an operating cost not to exceed 15c. an hour, excluding the wages of the operator, is claimed is manufactured by the Buda Company, Railway Exchange Building, Chicago, in a number of types. These range from the warehouse truck adapted to the carrying of loads on its own deck and having a two-wheel steer to the tractor with a four-wheel steer which may be used for pushing and hauling. They include an elevating truck, which, in combination with a false deck or loading platform, facilitates the transfer of materials of such weight as would otherwise involve a heavy labor cost for their handling.



A Worm-Driven Storage Battery Elevating Truck for Shop Use Employed as a Tractor

The following table gives the principal dimensions and specifications for the truck shown, and also for one having a higher platform which is fixed in position:

	Tractor	Truck
Rated capacity, lb	3,000	4,000
Over-all length, ft	8	8
Over-all width, in	40¾	40
Width of platform, ft	5	7
Wheelbase, in.	52	44
Gage of front wheels, in	31	31½
Gage of rear wheels, in	34	33
Height over deck, in	20¾	10½
Turning radius, ft	6	7
Weight, lb	2,200	2,060

The design of the truck features the use of a worm drive, the Timken-David Brown worm and worm gear being used in conjunction with a full floating rear axle on all types. The wheels also are mounted in roller bearings. In the design of frame and axles, materials and construction are employed with a view to service under heavy loading, and to promote maximum traction, especially where inclines are to be encountered, the wheels are fitted with solid rubber tires. For the operation of the truck a control has been devised in which the manipulation of the controller, circuit breaker and brake are interlocked. The operator stands upon a divided platform, one side of which is fixed, the other half being a hinged pedal actuated against a spring. When the operator's foot depresses this pedal to a horizontal position, it releases the brake at the same time completing the electrical connection between the storage battery and the motor. Conversely, if the operator's foot is removed or the pedal is permitted to rise, the circuit is broken and the brake applied, slowly or sharply as the case may be. Similarly the controller lever, which is fitted with equalizing springs, is automatically returned to a neutral position as soon as the operator releases it.

Three speeds in either direction ranging from 1 to 7 miles per hour are provided for both types of truck.

Tests of Coal Breaker Conveyors

Some data on the amount of power required to drive the conveyors are contained in a paper to be presented at the February meeting of the American Institute of Mining Engineers in New York, covering tests made on various electric motor-driven equipments used in the mining and the preparation for the market of anthracite coal. The conveyor lines were of the ordinary single chain flight type and were driven by motors ranging from 10 to 50 hp. in capacity, with the exception of main and refuse conveyors, which were of the mono-bar and double chain types respectively, and were driven by a 150 and a 20 hp. motor, respectively. The tests indicated that the load was fairly constant and the friction load very high.

The figures given in the following table are for a day's run of 9 hr.:

	Motor			Scraper			Line		
Conveyor	Sizes, hp.	Speed, r.p.m.	Output, hp.	No.	Area, sq. ft.	Spacing, in.	Length, ft.	Height, ft.	Speed per Minute, ft
Main	150	514	57.0	124	3.3	48	232.0	97	81
Surface	50	900	11.5	72	3.3	45	118.5	42	58
Rock	20*	900	5.3	114	1.2	27	119.0	0	80
Tailings	10*	900	3.9	42	1.2	27*	39.5	13	120
Cross	10*	900	3.9	64	1.2	27	37.5	0	114
Refuse	20*	900	3.2	65	1.2	27	73.0	0	114

*Equipped with back gears.

The authors of the paper are H. M. Warren, A. S. Biesecker and E. J. Powell, Scranton, Pa.

At the annual meeting of the Lunkenheimer Company, Cincinnati, Ohio, held Jan. 31, the following officers were re-elected: President, Edmund F. Lunken; vice-president, E. T. Lunken; second vice-president, Frederick Schaefer; secretary, David C. Jones. William H. Muench, who has been with the company for nearly 30 years, tendered his resignation as treasurer, as he has decided to retire temporarily from business. The office of the treasurer was consolidated with the secretaryship, Mr. Jones becoming secretary and treasurer.

Paying Bonuses to Indirect Labor

Production and Routing Methods and Way of Rewarding Effort at Plant of Northway Motor & Mfg. Company, Detroit

Some very interesting features are found in the shop management system in use at the plant of the Northway Motor & Mfg. Company, Detroit, Mich., builder of automobile motors. These include the bonus method of wage payment and the planning and routing systems. The entire system was worked out in the plant and it has been given a practical test of four years of operation. At first the bonus method of payment met with considerable opposition from the men, but it is stated that this opposition long since disappeared and that it is now very difficult to get a man to work on a straight day rate.

Form C.P. 9 — June 1, 1914.

BONUS TABLE-PRODUCTIVE WORKERS.

Eff.	Percent Bonus	Eff.	Percent Bonus	Eff.	Percent Bonus
75	1.	117	40.4	159	90.8
76	1.6	118	41.6	160	92.0
77	2.2	119	42.8	161	93.2
78	2.8	120	44.0	162	94.4
79	3.4	121	45.2	163	95.6
80	4.0	122	46.4	164	96.8
81	4.6	123	47.6	165	98.0
82	5.2	124	48.8	166	99.2
83	5.8	125	50.0	167	100.4
84	6.4	126	51.2	168	101.6
85	7.0	127	52.4	169	102.8
86	7.6	128	53.6	170	104.0
87	8.2	129	54.8	171	105.2
88	8.8	130	56.0	172	106.4
89	9.4	131	57.2	173	107.6
90	10.0	132	58.4	174	108.8
91	11.0	133	59.6	175	110.0
92	12.0	134	60.8	176	111.2
93	13.0	135	62.0	177	112.4
94	14.0	136	63.2	178	113.6
95	15.0	137	64.4	179	114.8
96	16.0	138	65.6	180	116.0
97	17.0	139	66.8	181	117.2
98	18.0	140	68.0	182	118.4
99	19.0	141	69.2	183	119.6
100	20.0	142	70.4	184	120.8
101	21.2	143	71.6	185	122.0
102	22.4	144	72.8	186	123.2
103	23.6	145	74.0	187	124.4
104	24.8	146	75.2	188	125.6
105	26.0	147	76.4	189	126.8
106	27.2	148	77.6	190	128.0
107	28.4	149	78.8	191	129.2
108	29.6	150	80.0	192	130.4
109	30.8	151	81.2	193	131.6
110	32.0	152	82.4	194	132.8
111	33.2	153	83.6	195	134.0
112	34.4	154	84.8	196	135.2
113	35.6	155	86.0	197	136.4
114	36.8	156	87.2	198	137.6
115	38.0	157	88.4	199	138.8
116	39.2	158	89.6	200	140.

Table for Determining the Amount of Bonus Earned by Direct Labor

In working out the bonus system it was the aim of the company to arrange one that would be entirely fair to the men. Under the system as perfected a man is guaranteed his day rate which is the same as the ruling rate paid for similar work by Detroit plants operated strictly on a day rate basis. In addition the man is paid for his individual efforts and in proportion to the results of those efforts, so that he not only is sure of his regular day's pay but always has an incentive to increase his output. An unusual feature of the system is that bonuses are paid to all indirect labor as well as to the direct labor, different methods necessarily being required to determine the bonus to be paid the former.

The planning and routing system provides a simple way for laying out work and routing material through the shop. All planning is done in the production office, shop planning being eliminated in this system. All orders are sent to the shop in the order in which the work is to be done. Among the merits claimed for the system of planning and routing is that it simplifies manufacturing methods, eliminates shortages as well as over-production of certain parts, the progress of work in the shop on any particular part is known at all times and costs are easily determined.

In establishing a bonus system for direct labor the company went on the theory, maintained by many employers of labor, that the average workman on a straight pay basis develops only 75 per cent efficiency. Using this as a basis a bonus schedule was prepared allowing the men a bonus on an efficiency of 75 per cent and over, the bonus increasing at the same rate as the increase in efficiency. The bonus schedule is so arranged that the cost is constant after 100 per cent efficiency but increases in the same proportion as the man's efficiency decreases between the two points of 75 and 100 per cent efficiency. The company, therefore, suffers a loss on every employee below 100 per cent in efficiency because of the increased cost of production. However, the limit of efficiency is set at 85 per cent and if a man shows only that efficiency or less he is either not retained or is placed in another department where he may prove to be a more capable workman.

As an example of the way the system works out take a man who is 100 per cent efficient. The predetermined standard time for a certain operation as arrived at by time studies is 0.5 hr. per piece. A man takes 10 hr. for doing 20 pieces, for which he is paid 30c. an hr. or a day rate of $3. A reference to the bonus table shows that he is entitled to a 20 per cent bonus in addition to the daily rate or $3.60 for his day's work. Suppose that another man does the same work in 8 hr. In this case by dividing the standard number of hours, which is ten for the twenty pieces, by his actual time or 8 hr., his efficiency is shown to be 125 per cent.

STOCK REQUIREMENTS

NAME OF PART Cylinder — PART NO. OR MATERIAL 1000

KIND OF MATERIAL #1540 — SIZE OR GAUGE

DIMENSIONS FOR SHOP 54 — EQUALS — PIECES

DIMENSIONS PURCHASED — EQUALS — PIECES

USED ON MODELS 45 52 55 — NO. PER UNIT 4 2 2 — CUSTOMERS Olds Oak Jackson

TO BE DELIVERED AHEAD SHIPPING SCHEDULE — ROUGH STOCK — FINISHED STOCK

1915 TOTAL REQUIREMENTS

DATE	ORDER NO.	CUSTOMER	PART NO. OR ROLL NO.	MODEL OR SIZE	NO. OF UNITS	PIECES PER UNIT	NO. OF PCS. REQUIRED	CUMULATIVE TOTAL
7/1	280	Olds		45	4000	4	16000	
7/2	281	Oak		52	5000	2	6080	22000
7/2	282	Jackson		55	3500	2	7000	29000
7/20		July	adjustment				36	29036

EQUALS UNIT OF MEASURE — QUANTITY — UNIT

REQUISITIONS TO PURCHASE

DATE	REQ. NO.	QUANTITY	CUMULATIVE TOTAL
7/1	241	16200	
7/2	242	6000	22200
7/5	261	7000	29200

DELIVERY SPECIFICATIONS

AUG.	SEP.	OCT.	NOV.	DEC.	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	
4200	5000											8500
1000												4200
2200	600											4200

The Planning Department Indicates the Amount of Stock Required to Fill Orders for a Certain Part

As the hour rate is constant his straight pay is reduced from $3 to $2.40, but the increased bonus amounting to 50 per cent for 125 per cent efficiency as indicated by the bonus schedule brings his total pay up to $3.60. These examples show that the cost per piece to the company in each case is the same, but that the man who is 125 per cent efficient earns the same in 8 hr. as the 100 per cent efficient man does in 10 hr. Carrying the same example a little further shows how the bonus system works out to the company's loss if a man is under 100 per cent efficient. If it takes another man 12 hr. for completing the twenty pieces for which the sandard time is 10 hr. he is 83.3 per cent efficient and is paid his hourly rate amounting to $3.60 plus a 5.8 per cent bonus, or $3.81 in all, as compared with $3.60 paid the two men who were not under 100 per cent efficient.

Bonuses are computed on a man's work during a pay period of one-half month and in this way his average efficiency is made the basis for payment. The standard time for the work he does may be 10 hr. on Monday, 12 on Tuesday, 9 on Wednesday, 11 on Thursday, 10 on Friday and 6 on Saturday. In that case he does in a 55-hr. week work for which 58 hr. standard time is allowed and he figures out 1.05 per cent efficient for the week. He earns in standard pay at 30c. per hour $16.50 and a bonus of 26 per cent, as shown by the bonus table or an actual bonus of $4.29 and a total pay of $20.79. If during the week of 55 hr. his work represents only 55 standard hours he is 100 per cent efficient and earns a bonus of $3.30 or $19.80 in all.

About 92 per cent of the direct labor in the plant is on the bonus system, most of the straight day work being on new operations for which there has not been time to determine standard hours by time studies. This makes it necessary for the men to work some of the time on straight hour wages and the rest of the time under the bonus system. In that case the same method is followed in computing the bonus as would be were a man doing nothing but bonus work. Suppose in a 55-hr. week a man is on straight pay work 8 hr. and 47 hr. on bonus work, and in that 47 hr. does work for which 52 standard hr. are allowed. In that case he has developed an efficiency of 110.6 per cent on his bonus work, which entitles him to a bonus of 33.2 per cent, or $4.68 in addition to his hour rate for the 55 hr.

In making the time studies the time actually allowed for an operation is the time that the studies indicate a good man should require for doing the work under normal conditions. Meetings of different employees are held two evenings a week, during which explanations by means of examples are made regarding the methods of computing the earnings from the bonus schedule, and explanations are given also relating to such forms as the material and production schedules and production check sheet referred to below, it being the purpose to keep the men as familiar with the system as possible. Each foreman is kept informed as to the efficiency of his men by having the efficiency record of each employee of his department posted in his office by the planning office.

STOCK ADJUSTMENT RECORD

PART NAME Cylinder MAXIMUM QUANTITY 20 PART NUMBER 1000

PURCHASED STOCK				IN PROCESS (Primary)				FINISHED STOCK				CUMULATIVE TOTAL			
Date	Quan.	Date	Quan.	Date	Quan.	Date	Quan.	Date	Quan.	Date	Quan.	Date	Quan.	Date	Quan.
7/4	20			7/10	2								22		
				7/11	1								23		
7/12	2												25		
								7/14	3				28		
				7/16	10								38		

TOTALS

FOR CLASSIFICATION OF DEBITS SEE OPPOSITE SIDE

A Stock Adjustment Record Is Made Out for Each Part and Shows the Number of Pieces That Have Not Been Used in Regular Production

REPORT ON MATERIAL AND PRODUCTION SCHEDULE

COPY TO _____ PLANT _____ DATE 7/17 1915

PART NO.	ROUGH STOCK				PRIMARY OPERATION				FINISHING STORES			
	Schedule	Received	Quantity Past Due	Dept.	Required	Received	Quantity Past Due	Dept.	Schedule	Received	Quantity Past Due	Balance Due This Month
1000	2250	1900	350	5	1750	1600	150	11	1250	939	301	561

The Weekly Report on Material and Production Schedule Goes to Various Shop Heads and Shows the Scheduled Amounts of Raw Material, Stock to be Machined and Finished Parts in the Stockroom and Those Actually Received

Every indirect labor employee from the assistant general manager down to and including the office help comes under a bonus schedule. The bonus table for these employees is the same as that for direct labor employees when it is based on an efficiency of 75 to 100 per cent, but for over 100 per cent efficiency the bonus does not increase so rapidly as it does for indirect labor employees. Bonus schedules for indirect labor employees are based on the direct labor of the plant and the pay roll of the department interested. A certain fixed allowance is made to the department interested for every $100 of direct labor in the plant. For reaching this allowance a bonus is paid based on an arbitrary amount, this arbitrary amount usually being the employees' wages. For example, if the planning department is made an allowance of $5 for every $100 of direct labor in the plant and the expense of the department is actually the amount of the allowance, employees of the department are paid a bonus of 20 per cent in addition to their salaries, this percentage of bonus being allowed under the bonus schedule for 100 per cent efficiency. Many of the indirect labor employees, particularly those higher up, are allowed bonuses under several schedules. The general foreman of a department is placed on four schedules. One

schedule is based on the average efficiency of his department. If the average efficiency of the men under him is 100 per cent the foreman is rated at 100 per cent under this schedule. This schedule is closely connected with the defective work or scrap schedule, the bonus earned under the efficiency schedule being increased by that allowed by the scrap schedule. For each $100 of direct labor in a department a foreman is allowed a certain amount on his scrap schedule. For reaching this allowance the bonus earned on his efficiency schedule is increased 100 per cent, as provided in a special bonus table. If he makes but 60 per cent efficiency on his scrap schedule the bonus he makes on his efficiency schedule is entirely wiped out. He is also placed on a schedule based on the indirect labor in his department and also on a schedule based on the expense of material in his department. The latter schedule is an allowance for each $100 of direct labor in his department. For reaching this allowance a bonus of 20 per cent for 100 per cent efficiency is allowed him, based on an arbitrary figure. The bonus paid the factory manager is based on the inventory balance, maintenance of equipment, defective workmanship, prepaid expense, labor cost of motors, material cost of motors, maintenance of buildings and grounds, water, heat, light and power and indirect labor. The bonus earned on these schedules is increased or decreased, depending on the production of motors.

The plant organization consists of a general manager, factory manager, efficiency engineer, production supervisor, machinery superintendent, assembly superintendent, foremen and assistant foremen. The production supervisor is at the head of the planning and standard time department and has charge of production. He carries out the details mapped out by the efficiency engineer.

Production and routing throughout the plant are directed entirely by the planning department, nothing being left to the responsibility of the foremen. After an order is received by the sales department a construction order is prepared by this department specifying the model number, number of motors required and the deliveries to be made by months. Carbon copies of this order are sent to the engineering department, purchasing agent, factory manager and superintendent of assembly. The engineering department uses its copy of the construction order to make out the parts list, specifying the number and name of a part, the kind of work to be performed, quantity of parts per unit and whether the parts are to be manufactured in the plant or purchased complete. Copies of the parts list are sent to the planning and purchasing departments. However, these lists are not required by the purchasing department in making its purchases.

From the parts list the planning department makes up a stock requirement sheet that shows

MATERIAL AND PRODUCTION SCHEDULE

PART NAME Cylinder QUANTITY IN LOT

MONTH		PURCHASED STOCK			SERVICE CARDS		PRIMARY OPERATION			FINISHED STORES			MONTH	PURCH
TOTAL REQUIREMENTS FOR CURRENT MONTH		Cumulative Schedule	Daily Receipts	Cumulative Receipts	Daily Receipts	Cumulative Receipts	Cumulative Schedule	Daily Receipts	Cumulative Receipts	Cumulative Schedule	Daily Receipts	Cumulative Receipts		Cumulative Schedule
TOTAL COMPLETED TO END OF LAST MONTH		1500					1000			500				
	1												1	
	2												2	
	3	1750					1250			750			3	
	4												4	
	5		500										5	
	6							200					6	
	7		400	900				200	400				7	
	8										100		8	
	9							100	500		89	189	9	
	10	2000					1500			1000			10	
	11							300	800		200	389	11	
	12		1000	1900				400	1200		150	539	12	
	13												13	
	14							500	1700		200	739	14	
	15												15	
	16							100	1600		200	939	16	
	17	2250					1750			1250			17	
	18		200	2100							150	1089	18	
	19												19	
	20		38	2062				100	1700		200	1289	20	
	21		500	2562				35	1665		3	1286	21	
	22										100	1386	22	
	23							500	1965				23	
	24	2500					2000			1500			24	
	25												25	
	26										200	1586	26	
	27							300	2265				27	
	28		500	3062									28	
	29												29	
	30												30	
	31												31	
		2500					2000			1500				
ADJUSTMENT														
TOTAL														

A Portion of the Material and Production Schedule Showing the Amount of Stock Purchased with Specified Delivery Dates and the Amount Received, the Number of Parts Scheduled for Production and the Actual Number Turned Out and the Quantity to be Delivered to the Finished Stockroom and the Actual Receipts

PRODUCTION ROUTING SHEET

PART NO. 20313

PART NAME Clutch Cone MODELS 107 SHEET NO. 1

TOOL NUMBER	OPERATION	Max. Rate	SCHEDULE NUMBER	OPER. NO.	MACHINE NUMBER	DEPARTMENT	STANDARD TIME OR PIECE PRICE: CHARGE MACHINE	STANDARD TIME OR PIECE PRICE: UNIT S. T. OR PIECE PRICE	QUANTITY IN 10 HOURS
1460 Gau 8770 Fix	Ream and burr hole	30	M 8132	1	DS 107	5		.0167	600
	Spot weld spring retainer	30	B 3607	2	HW 1	5		.045	222
1633 Jig	Ass'l leather drill & rivet	26	B 3608	3	DS 57	5		.22	45
1562 Gau	Disc grind leather	30	M 8116	4	GD 2	5		.031	320
698 Gau	Inspect-			5		40			

Production Routing Sheet Showing the Order in Which the Various Operations Are Performed on a Part, the Machine to be Employed and the Standard Price and Rate of Production

the name and number of the part, the kind of material required, the customer's name, the model number and, in case the parts are to be manufactured, the number of pieces that are to go through the shops in a lot and the number of pieces per unit. The method of making out the stock requirement sheet is made clear by the accompanying reproduction of one of these sheets that specifies stock requirements for cylinders for three models of motors. The kind of material is designated by the company's analysis number. The number of pieces that are to go through the shop in a lot is indicated in the blank space opposite the words "Dimensions for Shop." Ruled column spaces are provided for the number of units in each order, number of pieces in each unit, total number of pieces in each order and an accumulative table shows the total number of pieces required. On the same form other columns are provided for making entries of requisitions issued for the purchase of stock, giving the date of the requisition, number wanted and the delivery specifications.

On another form is kept a stock adjustment record which is made out for each part number. On this form are listed all parts that are scrapped in the process of manufacture, parts that are sent out for repairs and replacements and, in fact, all parts that are not used in the regular production. Once each week or two the number of parts shown on the adjustment record is posted in red ink on the stock requirement sheet, thus indicating the number of additional parts required for replacements. Columns are provided on this form for recording raw stock that is defective, parts that are scrapped in the process of manufacture and parts scrapped after being finished, or taken for replacement. The number of pieces shown in the stock adjustment record is deducted from the receipts shown on the material and production schedule so that when a delay report is made for parts the number that went into scrap or were used for repairs is shown in the past due column.

One of the most interesting and most important forms used is that containing the material and production schedule. This is made out for each part number and shows the name of the part, model number, number of pieces in each unit and customer's name. Column spaces are provided for each day of the month showing in accumulative form rough stock purchased with specified delivery dates covering the month's requirements, and in the next two columns the total amount of stock received, this being entered from the receiving slips. The number of pieces scrapped or taken for replacements is entered in red ink in these columns and deducted from the total. In the next three columns under the heading of primary operations is shown the production schedule and the parts actually turned out. Under the heading of finished stores is listed the production schedule of finished parts and the number of parts delivered to the finished stockroom together with the dates of delivery. In making up the material and production schedule the practice is to purchase enough raw stock six weeks ahead of delivery dates for finished parts, sending this stock to the shop for primary operations four weeks before the shipping date and delivering the finished parts to the finished storeroom two weeks before shipment. For example, as shown in the schedule illustrated, if the production is 1000 parts per month, stock for 1500 parts is on hand six weeks ahead, 1000 parts go through the primary operations four weeks ahead and there is a stock of 500 completed parts in the stockroom two weeks ahead. A very similar material and production schedule form is used for parts manufactured outside the plant, showing the requirements receipts, etc.

A report on the material and production schedule is made out each week from the material and production schedule record. This shows the part number, schedule, receipts and quantity past due in the rough stock, primary operation and finished stores department. The last column shows the balance due at the end of the month to be up with the schedule. This weekly report is made for every manufactured part and goes to all foremen, division superintendents and to the purchasing department. The main object of this report is to show the shop and purchasing department what parts they are behind on.

A shop order or production sheet is made up from the material and production schedule by the dispatcher in the planning room. This shows the order number, number and name of the part and number of pieces that are to go through the shop in a lot. On this sheet are listed also the operations to be performed as shown by the production routing sheet. This shop order goes to the clerk, who makes out the service ticket and stock requisitions. The latter shows the part number, order number, lot number, number of pieces, department to which delivery is to be made and machine to which the stock is to be delivered. He also makes out a shop tag which travels with each lot until it reaches the finished stockroom. When the ma-

terial is to be delivered from the rough stockroom, the requisition is sent back to the purchasing department and the material delivered is entered on the material and production schedule in the column provided for daily receipts under the heading of primary operations. The same clerk makes out a storeroom receipt which is sent with the goods to the storeroom and which when it comes back from the storeroom is entered in the daily receipts column under the heading of finished stores.

The production routing sheet is made out for each manufactured part and shows the operations required in the same order in which they are to be performed, the number of the machine on which the work is to be done, the department number, the standard price and the standard quantity to be produced in 10 hr.

A service or time card is made out in the planning department for each operation shown on the production routing sheet and is given to the production foremen and to the workman, one copy being retained in the planning room, where it is posted on the production check sheet or shop order. By posting the service ticket on the production check sheet the planning department is able to keep track of the progress of the work in the shop and can tell at any time where a certain lot of work is. The time of starting and finishing an operation is entered on the service card so that this shows the actual time required for the work.

When the production foreman requires material on the floor he sends a requisition duplicate to the stockroom, together with the tag that accompanies the service card. The storekeeper sends the original requisition to the accounting department while the duplicate goes back to the shop, and when it reaches the production foreman serves as a notice to him that the material is at the machine. As soon as the requisition reaches the production foreman he places the service card on the production board in the production booth for the first operation under the heading provided for the machine called for on the card. Three adjoining pockets are provided on the board for the service cards, the upper one showing the operation that is going on, the second containing the card bearing the next order to be taken up and the third the next following job. The service cards are made out in the planning department in triplicate and when the machine operator comes to the booth after a job the foreman gives him the work that is posted to be taken up next, as shown by the card in the second pocket. The time is stamped on one copy of the card, which is placed in the man's rack and one copy is placed on the production board in the top pocket to show what operation the man and machine are performing. The third copy is given to the workman, this showing him the number of pieces and standard time per piece. When the man has completed the number of pieces called for on the service card he turns his card into the production foreman, who gives him the next job. The time of completing the operations is stamped on all three copies of the service cards. The copy that was kept on the production board is attached to the time card copy, which differs from the others in that it has a blank on the back for entering the elapsed hours, hourly rate and the man's pay. These two cards are forwarded to the cost department. The copy that the man takes with the work and returns when he finishes the job acts as a move order to move the lot from the machine where the operation was performed to the machine designated to do the next operation. This copy is then handed back to the operator as his receipt so that on pay day he has a receipt for all the work he has done during the half-month pay period.

After the lot has traveled through the plant and the various operations are completed, it goes to the inspection department on a storeroom receipt, which acts as a move order for the material to be moved from the factory to the inspection department and from there to the finished stock department. The storeroom receipt is made out at the same time as the service card and stays in the production booth in the pockets with the service card until the job is finished. After the final operation the man turns in his service card, and the storeroom receipt is placed on a separate move board where a trucker gets it and moves the finished parts to the inspection department.

The general methods of production and routing in the assembly department are similar to those used in the machinery department, the assembly department having a production booth, time cards and other forms that are similar to those used in the machinery department. Requisitions are made for finished parts to be assembled in the same manner that requisitions are made for rough stock in the machinery department. When a requisition for finished stock is sent to the finished storeroom it bears a symbol number that corresponds with a symbol number on a master list. This master list is kept in the storeroom for every sub-assembly and shows every part and the number of similar parts that go to make up a sub-assembly. It also shows in a complete motor all the sub-assemblies and single parts that go to make up a complete assembly.

Memorial Tablet to the Late George Westinghouse

The presentation to the Westinghouse Electric & Mfg. Company by veteran employees of the company of a bronze memorial tablet of the late George Westinghouse was noted in THE IRON AGE of Feb. 3, in a brief report of the banquet of the Westinghouse Veterans' Association on Jan. 29 in the Fort Pitt Hotel, Pittsburgh. The accompanying illustration is a reproduction of the tablet. It was sculptured by Lorado Taft and was cast in bronze and placed in position by James H. Matthews & Co., Pittsburgh, Pa. It is approximately 3 x 4 ft. in size and weighs about 300 lb. It bears the inscription, "George Westinghouse, Master Workman, Inventor, Founder, Organizer, 1846-1914." It is to occupy a place in the reception room of the Pittsburgh works of the company.

INVENTOR · FOUNDER · ORGANIZER
AS A TRIBUTE TO HIS MEMORY
THIS TABLET IS ERECTED BY THE
VETERAN EMPLOYEES ASSOCIATION
WESTINGHOUSE ELECTRIC AND
MANUFACTURING COMPANY · 1916

There were about 400 present at the banquet. Addresses were made by E. M. Herr, president; L. A. Osborne, vice-president; N. W. Storer, general engineer; B. Kupferberg of the storeroom office; Charles F. Scott, consulting engineer, and Guy E. Tripp, chairman of the board of directors. Each speaker referred to some different phase of Mr. Westinghouse's life which had particularly impressed him.

American Can Company's Year

The American Can Company makes a highly favorable showing in its report for the year ended Dec. 31, 1915. The income account makes the following comparison with the previous year:

	1915	Increase
Net earnings	$6,533,806	$726,004
Less amount written off for depreciation	850,000	100,000
Balance	5,683,806	626,004
Interest on debenture bonds	654,533	*27,096
Balance	5,029,273	653,100
Dividends paid (7 per cent on preferred stock)	2,386,331	.....
Balance to surplus	$2,142,942	$653,100

*Decrease.

The condensed balance sheet as of Dec. 31, 1915, compares with that of the previous year as follows:

Assets

			Changes
Plants, real estate, patents, etc.	$69,907,287	Dec.	$172,795
New construction	15,229,896	Inc.	777,561
Other investment items	1,635,382	Inc.	359,197
Cash	3,605,766	Dec.	1,184,382
Accounts and bills receivable	4,041,121	Inc.	131,836
Inventory of materials and products	12,275,542	Inc.	3,314,039
Total	106,694,994	Inc.	3,225,455
Export department	7,956,796	Inc.	7,956,796
Grand total	$114,651,790	Inc.	$11,182,251

Liabilities

Preferred stock	$41,233,300		.....
Common stock	41,233,300		.....
Debenture bonds	12,912,000	Dec.	$536,000
Accrued interest on debenture bonds	269,000	Dec.	11,166
Accounts payable	2,132,318	Inc.	1,217,912
Dividends payable	721,583		.....
Contingent fund	2,157,912	Inc.	411,768
Surplus	6,035,581	Inc.	2,142,942
Total	106,694,994	Inc.	3,225,455
Export department	7,956,796	Inc.	7,956,796
Grand total	$114,651,790	Inc.	$11,182,251

In his accompanying remarks to stockholders President F. S. Wheeler says:

"The year 1915 was more prosperous for the company than conditions early in the year indicated. Net earnings increased $726,004 over 1914, notwithstanding a decline of about 4 per cent in the volume of business. This decrease in volume was caused by a shortage of some of the staple canning crops, due to continued wet weather at a critical part of the season. The larger profits are traceable to increased efficiency, made possible by improvements to plant and equipment, as well as the loyal and earnest co-operation from an able organization.

"All plants have been fully maintained and are in first-class, efficient condition. There has been expended for new construction and new equipment the sum of $1,930,629.44, chiefly at the following places: Chicago, San Francisco, Kansas City, Ogden (Utah), Lubec (Maine) and Hawaii.

"The record made during the year for satisfactory service to the customers has added to the already substantial good will enjoyed by the company. The safety department has made further progress in providing better working conditions for employees, one of the results being a material reduction of the number of injuries.

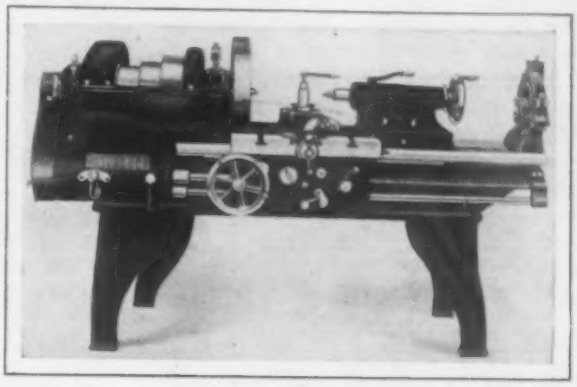
"During 1915 contracts were entered into for foreign shipment amounting to about $34,000,000. These contracts are for delivery during 1916 and were taken on a profitable basis. No earnings from these contracts appear in the 1915 statement, but, on the contrary, preparatory expenses incurred (amounting to $420,425.76) have been charged against the earnings of 1915. In the export department only tangible values have been inventoried.

"During 1915 testimony for the company's defense in the Government's suit under the Sherman act was completed and final arguments were made in October. Your officers see no reason to change the hopeful view previously expressed with reference to this litigation.

"The prospects for the coming year are bright. The general improvement in business throughout the country is manifesting itself in good demand for the company's products and preparations are now making for an active year."

Back-Geared Quick Change Lathe

The Sidney Tool Company, Sidney, Ohio, is now building double back geared, quick change engine lathes in 17 and 19 in. sizes. They are built along the conventional lines, but special attention is called by the manufacturer to the bed construction and another feature is the width of the carriage V, which is 2½ in.



A 17-In. Engine Lathe with Back and Quick Change Gears and a Wide V Carriage Bearing

The bed is made with heavy double wall cross girts spaced 2 ft. apart and designed to resist heavy strains that result in different kinds of work. The bed has two ways, a large one in front and one standard way in back.

The compound rest is rigidly designed and the swivel is made completely circular, graduated in degrees and is clamped on the cross slide by heavy bolts. The tailstock spindle is fastened in position by a double plug binder constructed so as to clamp the spindle securely at any position without affecting the alignment. The headstock is of closed tight pattern offset 1 in. off centers, making it adaptable for heavy duty work. The lathe apron is a one-piece casting and is grooved, pinned and bolted to the carriage.

Steel gears are used throughout and the cone gears in the quick change gear mechanism are cut with 22½-deg. angle cutters, thus forming a pointed tooth slightly rounded at the top. The quick change mechanism is mounted on the front ends of the machine, being fixed to the bed by tongue and groove, which is relied upon to insure accurate alignment. As will be noted the lathe is pulley driven, which is a type especially adaptable for turning shrapnel.

Record Output of Tungsten Ore in the United States in 1915

The tungsten ore output of the United States in 1915 is placed by the U. S. Geological Survey at about 2165 net tons of concentrates carrying 60 per cent of tungsten trioxide and valued at more than $2,000,000. This is a record output, the largest previous one being 1821 tons in 1910.

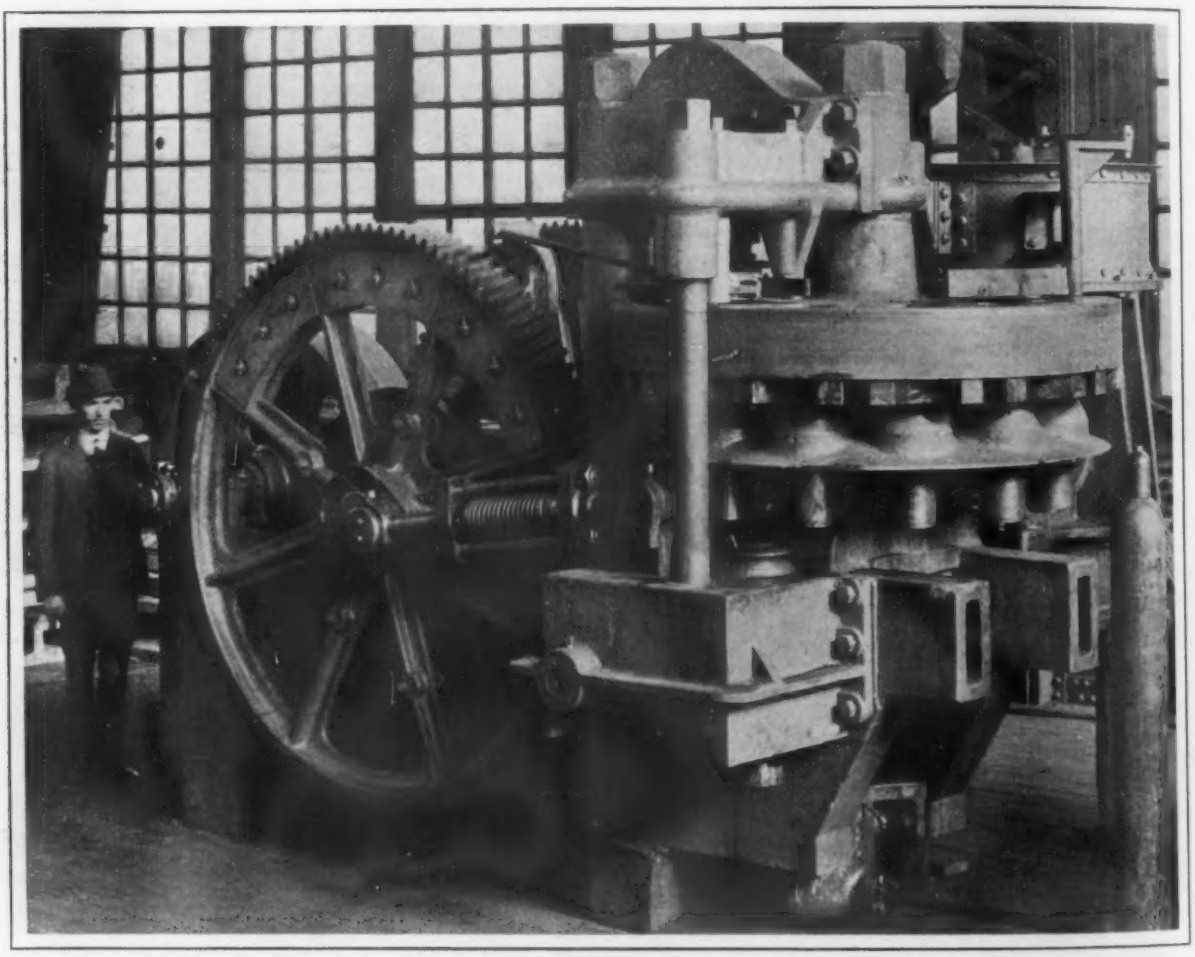
While the price of ore late in 1914 was $9 or more per unit of contained tungsten, 60 per cent ore was sold as low as $5.80 per unit early in 1915. The price has since then steadily advanced until $50 and even as high as $62.50 per unit or more has been paid.

Early in the war England commandeered all the ore that was produced in any of the colonies, fixing a maximum price of 55s. per unit or about $13.50. American consumers since then have obtained ore from Mexico and South America. Portugal and Spain are also producers but they are controlled by British capital, says the *Engineering and Mining Journal.* Only recently have arrangements been made by which tungsten ore, contracted for in Portugal and Spain, may now be shipped, the first cargo of any size leaving for New York in December last. Japan shipped tungsten ore to this country when the price had reached $44 per unit and large amounts have been booked.

POWER BRIQUETTING PRESS

A Toggle Type Unit for Flue Dust Installed at the Wickwire Steel Plant

A power lever briquetting press has been recently completed by the William Tod Company, Youngstown, Ohio, for the General Briquetting Company, New York City. It was shipped to the Wickwire Steel Company, Buffalo, N. Y., and will be employed for briquetting waste material not suitable for use in the blast furnace on account of its fineness. The noteworthy features of the design are the manner in which the safeguarding against breaking or unduly stressing the principal members of press has been provided for, the absence of registering holes or plungers and the automatic character of the movements, from the filling of the molds to the discharge of the finished briquette. The least intelligent class of labor, it is emphasized, is thus made available for its operation.



A Power Briquetting Press of the Toggle Type for Use at Blast Furnaces

The design of this press is closely along the lines of the Breuck-Kretschel press, which has been in use for some years at the briquetting plant of the Lackawanna Steel Company, Lackawanna, N. Y. It is of the lever, power actuated type, better known probably as the toggle type of press. Power is applied by means of a belt.

The press is self-contained and is mounted on a double girder bed plate, one end of which, by means of cross girders, serves as the lower platen of the press. The upper platen or press head is held in position by tie bolts and separators, one of which serves as the journal or axis about which the mold and plunger platen revolves. To the other separator is attached a brake to dampen or check the motion of the mold platen and prevent any slight over travel due to lost motion of the revolving mechanism.

The mold platen has pockets to receive twelve cylindrical steel mold liners with an inside diameter of 7½ in., each of which is provided with a plunger fitting in a bored brass bushed guide held by spanner rings in a flange below the mold. This flange is an integral part of the mold platen. The upper end of the plunger always remains in and is guided by the lower end of mold liner. The top of the platen and upper end of the plungers are provided with removable wearing plates. The lower end of the mold plunger is in contact with the top of the press plunger when the crank is nearly at 90 deg. beyond the lower dead center and the pressing has begun, but the timing of the mold platen is such that the plungers come to rest over the press plunger while the crank is approaching or just about at the lower dead center with clearance between them. The press plunger is mounted on a strut with a hemispherical end to take care of the slight swinging motion of the strut due to its pin connection to the lever. Above the mold when in position in the press frame are a die and punch with shear plate to give relief against any excessive pressure. To provide for ordinary pressure variations in forming briquettes the fulcrum of the main lever is carried by an oil cylinder, the only outlet of which is connected with a flask of nitrogen gas at a pressure of 2500 lb. per square inch. With this nitrogen pressure through the lever system, a pressure of 8400 lb. per square inch is said to be obtained on each briquette made. Not until this pressure is exceeded sufficiently to force the oil plunger to the bottom would the shear plate safety device come into play.

The use of a belt drive is relied upon to provide a further safety precaution, for under ordinary conditions the belt will slip and machine stall without failure of safety shear plate. Sufficient elasticity exists in the tie bolts, rods, lever and shaft to account for the absorption of the inertia of parts between the belt pulley and the shear plate to protect the machine if the belt slips.

Material properly mixed is discharged by an elevator into the hopper and carried around by a set of vertical scrapers so as to fill the molds as they come in position under it. The mold platen is driven by an interrupted pinwheel keyed to a vertical shaft. This pinwheel carries a single pin engaging slots in the under side of the upper portion of the mold platen and the somewhat enlarged hub of wheel engages a cylindrical recess machined in the platen between the pin slots. In this way the platen is locked for nearly half the revolution of its driving shaft. It is during this locked period that the filling, pressing and discharge of briquettes from the molds take place.

The mechanism for discharging the briquettes from the molds consists of a plunger carried by a bracket bolted to the side of the girder and actuated by a bell crank driven by a connecting rod attached to a crank pin in the hub of one of the main driving gears. A compression spring protective device is provided for the connecting rod. The briquette when forced up by the discharge plunger to clear the mold is pushed off the top of plunger by a cross-head to the space between the molds. Motion for the cross-head is obtained from another bell crank. A grooved cam keyed to one of the main driving gears engages a roller pin on the end of one arm of the bell crank to give the proper timing.

After being pushed off the briquettes lie on top of the mold platen until discharged from it on a conveying belt by the swinging paddle. Motion for this is obtained from the end of the vertical shaft above the ore hopper by a slotted crank which permits of some adjustment of the swinging motion of the paddle.

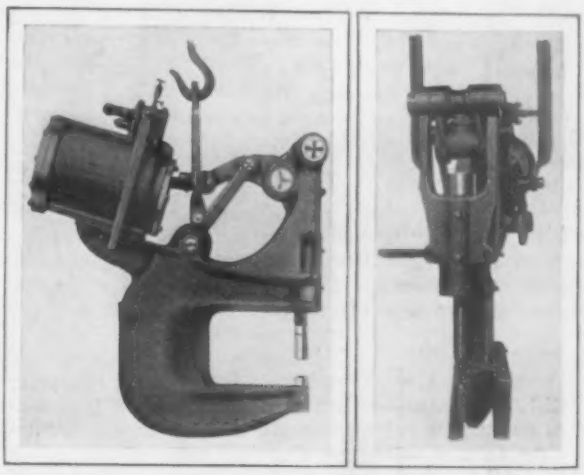
Quiet operation of the press has been enhanced, it is pointed out, by the use of a double helical cut gear. These are of steel, and one-half of the gear is put on each end of the main crankshaft. The capacity of the press is 1200 briquettes 7½ in. in diameter and 3½ in. thick, or approximately 10 tons per hour. The usual rate of production is twenty briquettes per minute, equivalent to a speed of 20 r.p.m. of the main gears, or 175 r.p.m. of the belt pulley. Tight and loose pulleys are provided to insure quick stopping in an emergency.

Low Pressure Turbine to Use Hammer Exhaust

The Rockford Drop Forge Company, Rockford, Ill., is installing a 300-kw. Westinghouse low-pressure turbo-generator set to operate on exhaust steam from the hammers in the forge shop. The hammers number 17, ranging in capacity from 800 to 4000 lb. The exhaust steam is collected in a 10-in. overhead main and the distance to the turbine station approximates 125 ft. The steam is used at a pressure of 2 lb. at the turbine, and connection is made with the live steam main through a reducing pressure regulator so that inadequacy of exhaust steam at any time is compensated for automatically. This turbine unit will supply power for the die-sinking department and it will also provide for the requirements of the adjacent Mechanics Machine Company, replacing electric power previously purchased. Heretofore the exhaust has only been utilized for shop heating and feed-water heaters, the greater portion having been wasted. With the new turbo-generator unit, a saving of $1,000 per month is figured.

Riveting Machine for Columns

A specially designed riveting machine for lattice column work has been placed on the market by the Hanna Engineering Works, 2059 Elston Avenue, Chicago, Ill. The general construction of this machine is the same as that illustrated in THE IRON AGE, April



Side View of a Riveting Machine Designed Especially for Work on Lattice Columns and One Showing It in Place for Riveting

8, 1915, the specially distinguishing feature being the limited space in which it will operate as is brought out in the right portion of the accompanying illustration.

The toggles, levers and guide links are combined to give the large opening of the toggle joint movement with a gradual increase in the amount of pressure applied until the desired amount is secured. This is followed by a simple lever movement through a considerable space under approximately the maximum pressure of the machine. As was the case with the earlier machine, the toggle action takes place in the period when the piston is making the first half of its travel, the die traveling through a large portion of its stroke at the same time. During the time required for the remainder of the piston travel, the die completes its stroke, it being emphasized that the amount of piston travel is enough to eliminate any uncertainty regarding the pressure applied to the rivet. The change in the action of the mechanism from that of a toggle to that of a lever is accomplished automatically without a critical point. The relatively large space through which the rated maximum pressure is exerted, it is emphasized, does away with the necessity for adjustment, after the machine has been set for a certain length of rivet and thickness of plate, to take care of ordinary variations in the length of the rivet, the size of the hole or the thickness of the plates. As a predetermined pressure is applied to the rivet at each blow, it is pointed out that it is unnecessary to strike a rivet more than once. The slow movement of the die while the lever action is taking place is relied upon to give the metal in the rivet time to flow and fill the hole, as well as providing an opportunity for the rivet to set prior to the releasing of the pressure on the return stroke of the die.

Steel castings are used for the frame, main lever, guide links, toggles, plunger and piston rod head and cast iron for the main frame bushing and parts of the cylinder. The lower toggle and the die holder and screw, dies and piston rod are made of high carbon steel.

At the annual meeting of the stockholders of the Zimmerman Steel Company Bettendorf, Iowa, held Jan. 25, J. W. Bettendorf, president of the Bettendorf Company, was elected a director and Wm. C. F. Zimmerman, Henry L. Zimmerman, F. W. Zimmerman and H. V. McCluskey were re-elected as directors. The directors authorized the issuance of the remaining $61,000 in stock, most of which was subscribed for by the present stockholders.

Sulphur Elimination in Coking Processes*

The Effect of Aeration and Watering Out in the Beehive and By-Product Ovens—The Chemical Reactions Involved

BY J. R. CAMPBELL

Sulphur is known to exist in coal as sulphides and sulphates, as can be determined experimentally. Then there is the so-called organic sulphur, or, sulphur in combination with the carbon, hydrogen and oxygen of the coal, about which much has been written, but nothing definitely proved in an experimental way. In fact, so far as we know, there never has been developed a satisfactory and conclusive method in the laboratory for the direct determination of organic sulphur.

For most coking coals it can be safely assumed that the preponderance of sulphur is in the form of pyrite (FeS_2). When exposed to comparatively low temperatures during the coking process, it loses its sulphur according to the following chemical reaction: $7FeS_2 = Fe_7S_8 + 6S$. It will be seen, therefore, that six out of the 14 atoms of sulphur (or 42.8 per cent) are expelled, or volatilized. Fe_7S_8 remains in the coke as pyrrhotite, or magnetic sulphide of iron; this accounts for the highly magnetic properties of the powdered coke. A more commonly accepted reaction is $FeS_2 = FeS + S$, in which the straight sulphide of iron is produced with 50 per cent volatilization of sulphur.

SULPHUR IN BEEHIVE COKING

In the beehive methods of coke making, air is introduced in sufficient amounts to carry on the distilling and the coking processes, and the sulphur is oxidized along with the other volatile products: First, into sulphur dioxide (SO_2), known by the pungent and suffocating odor emitted from the trunnel head; second, into sulphuric anhydride (SO_3); and, finally, into sulphuric acid, as it comes into contact with the air and moisture. In a properly regulated draft on a beehive oven, there is never complete combustion of the gases. In other words, the coking process should be carried on in a reducing atmosphere and a low-grade producer gas kept issuing from the trunnel head. For coals of about 30 per cent volatile matter, the ratio of air to gas is 3½ to 1. In complete combustion, the ratio is 6 to 1, producing an extremely high temperature in the crown of the oven, 3500 deg. Fahr., more than enough to cause fusion of the refractories used. A good coking temperature is 2500 deg. C. in the crown of the oven.

It follows then that the sulphur remaining in the coking mass as iron sulphide cannot in any way be affected by the aeration or draft on the oven. Among beehive coke-oven operators there used to be a saying, "the hotter the oven, the more sulphur burned out." In view of the foregoing, this probably never was true unless the aeration was carried to complete combustion of not only the volatile gases but the fixed carbon itself, in which case the iron sulphide (FeS) would, of course, be oxidized to Fe_2O_3, and the sulphur liberated, as usual. This condition would not be productive of good results, as the percentage of coke yield would be abnormally low and the "ashes," or "braize," correspondingly high. This is evidence that so far as the pyritic sulphur is concerned, any sulphur that is volatile at all is so at comparatively low temperatures through the agencies of distillation, and no practical method of superaeration will help in the least in the further elimination of sulphur.

On the other hand, overheating promotes certain chemical reactions in which sulphur forms compounds with other bodies on which heat has no effect. If the coking process proceeds too quickly, or if the heat is irregular, the desulphurization of the coke is apt to be less complete. In these matters much depends upon the skill and judgment of the burner.

SULPHUR IN BY-PRODUCT COKING

In the by-product oven, which is essentially a true distillation process, the heat being applied externally and no air supplied to the oven itself, the sulphur is distilled from the pyrite as atomic sulphur as previously explained but apparently it afterward combines with the hydrogen of the coal gas, forming sulphuretted hydrogen (H_2S), for it is necessary to remove this very objectionable gas before artificial gas can be used for domestic purposes. This is accomplished by the use of hydrated oxide of iron, a by-product now obtainable from mine-water purification.

Here again appears the fallacy of superaerating beehive ovens to eliminate sulphur, for in by-product ovens in which no air is admitted there is just as much desulphurization of the coke as in beehive process; in fact, there is more desulphurization when the matter of increased yield is considered. For example: Given a yield of 70 per cent coke by the beehive process and 75 per cent by the by-product process from coal carrying 1 per cent sulphur, the respective problems are as follows:

	Beehive Oven, Per Cent		By-product Oven, Per Cent	
Sulphur in coal	1.000		1.000	
Sulphur volatilized	0.428		0.428	
Sulphur remaining	0.70)	0.572	0.75)	0.572
Sulphur in coke		0.817		0.763

So that the practical volatilization of sulphur from the beehive process is only 18.3 per cent, while in the by-product it is 23.7 per cent. In our own beehive practice we have always used 20 per cent as the amount of sulphur eliminated from all sources, figuring from coal to coke, this being the result of numerous laboratory and practical tests on the Connelsville coal.

Attention has been directed in the preceding paragraphs to the sulphur as pyrite. Let us look into the other forms that may be present in addition to the sulphide. Any organic sulphur present remains, for the most part, in the coke. It is readily seen how it would be unaffected by aeration except in event of total destruction of the carbon itself, with which the organic sulphur is supposed to be combined.

Any sulphates present, such as $CaSO_4$, would also be unaffected by aeration or superaeration in the beehive process; no amount of "airing" would help to eliminate the sulphur. We know of cases in which the sulphur in the resultant coke was as high, or even higher, as in the coal, from which it must be concluded that much of the sulphur was present in the coal as sulphate, or the so-called organic sulphur; or else the ash of the coal was rich in iron, lime and magnesia, for there is a dictum that it is never possible to produce a low sulphur coke from the coal the ash of which is high in these elements. Superaeration cannot and will not ameliorate these conditions.

THE EFFECT OF QUENCHING ON SULPHUR

Perhaps everyone is familiar with both the beehive and by-product oven practice in this country, quenching the coke by copious amounts of water. In the former case, it is customary to "water out" in the oven itself, while in the latter it is done externally by means of suitable quenching stations. In beehive practice, it takes approximately 1000 gal. of water to quench a 5-ton charge of coke, consuming about ¾ hr., either by hand watering with a hose, or with a sprinkler of the Stauft type, which is placed in the oven on top of

*From a paper to be presented at the February meeting of the American Institute of Mining Engineers, New York. The author is chief chemist, H. C. Frick Coke Company, Scottdale, Pa.

the coke. The by-product practice is much quicker, but the external watering produces darker coke.

Theoretically, it would seem possible to remove considerable sulphur by the quenching process. We have already indicated how iron sulphide (FeS) is formed in the coking process. The action of the water on the sulphide is as follows: $FeS + H_2O = FeO + H_2S$, in which it is assumed that the coke is quenched externally. The odor of sulphuretted hydrogen is easily detected (but it will be appreciated that a little of this gas goes a long way), and the color of the coke, wherein rust spots appear, shows the presence of iron oxide. The practical coke burner is always suspicious of what he terms "rusty coke," as it invariably is an indication of high sulphur coke. The same holds true in quenching in the oven itself, as in beehive practice. Sulphuretted hydrogen (H_2S) is evolved, but, at the same time, the water as steam is decomposed by the carbon, $H_2O + C = CO + H_2$, which fact prabably accounts for a part of the large percentage of carbon monoxide and hydrogen gas found in the gas from tunnels of beehive ovens, the water being formed from the combustion of the gases during the coking processes, which is virtually a low grade producer gas of the following composition:

	By Volume, Per Cent
CO_2	3.0
CO	9.0
H_2	11.0
CH_4	0.3
N_2	76.7

The desulphurization of coke by water cannot be complete. The coke mass cools too quickly and its very structure prevents the rapid penetration of the water thrown on it, especially in the denser varieties. As the temperature is lowered the reaction involved becomes too slow to be of practical benefit. Data as to the exact amount of sulphur eliminated in this way are rather scarce, but our own experience, based on the general laws of volatilization set forth elsewhere, leads us to the conclusion that only an infinitesimal percentage of sulphur is thrown off during the quenching process. Laboratory and practical tests, in which the coke has been allowed to cool naturally, show but little difference in the sulphur content from those in which the coke has been quenched with water. Certainly there could be only a few hundredths of 1 per cent. in favor of the water-quenched coke, at the most, in a coke averaging 1 per cent. sulphur.

The prime object of the use of water is to lower the temperature of the coke for handling, not for desulphurization, and the quenching process should be so regarded. However, we are of the opinion that quenching by the by-product practice will eliminate more sulphur than by the beehive method, which may partially explain the greater total volatilization of sulphur in the former, elsewhere intimated.

It may not be generally known, in connection with the subject, that addition of muriatic acid (HCl) to the water greatly facilitates the removal of sulphur during the quenching process. The action of this acid on iron sulphide is positive at all temperatures, thus, $FeS + 2HCl = FeCl_2 + H_2S$. There was, of course, a time when the cost prohibited the use of this method, but with the depletion of our low sulphur coking coals this may, in the near future, be a factor in the elimination of sulphur.

Smoother Steel Castings

J. C. Davis, fourth vice-president of the American Steel Foundries, Chicago, has been granted a patent (U. S. 1,165,651, Dec. 28, 1915) on the art of casting steel with particular reference to a method of hardening or modifying the face of steel castings. Mr. Davis does away with the common practice of applying a wash to the face of the mold consisting of a carbon-containing material, sand and binder, in the use of which, he claims, the combustion of the carbon gives off a gas which is prevented from escaping and which lies naturally against the face of the mold, causing rough castings. He substitutes a mixture of a carbonaceous material such as 80 per cent ferromanganese, silica molding sand and linseed oil, combined in substantially the following proportions:

1½ lb. ferromanganese
½ lb. molding sand
⅓ pint linseed oil

These, when thoroughly mixed, are claimed to form a plastic substance suitable to apply to the mold, backed up with the usual backing sand, the mold being rammed and dried in the usual manner. After the metal is cast the carbonaceous material is probably ignited as heretofore, but the use of silica molding sand is said to serve to create voids or interstices for the escape of gases so that the final castings are much smoother than with the old practice.

Preparing Brown Coal for German Market

George J. Young, professor of mining, University of Minnesota, Minneapolis, Minn., will present a paper at the February meeting of the American Institute of Mining Engineers to be held in New York City based upon a visit made in the spring of 1910 to a number of open-pit brown coal mines and underground workings in Germany. The mining of brown coal is one of the important industries of Germany and in preparing the coal for the market it is graded into large lump, fist, nut and fine sizes, the first three being sold without further preparation. The last, so the paper states, is mixed with water and put through a common brick press, the product being bricks about the size of those ordinarily employed in building. These are air dried in open sheds and sold as nass brick, containing about 20 per cent of moisture.

The greater part of the brown coal output is briquetted, the coal being first passed through crushing rolls that reduce it to ¼ in. in size. From the crushing rolls the material is elevated and conveyed to driers, constructed very much like McDougall ore roasting furnaces, each of the thirty-two hearths being covered by a steam coil. The coal is distributed by rabble arms that transfer it from hearth to hearth. The coal enters with about 50 per cent of moisture and is discharged with approximately 12 per cent. From the driers it is conveyed to bins from which it is fed to the briquetting presses.

The presses employed for making the briquettes are of the steam-driven type, the die or mold being composed of two steel plates which form symmetrical halves and are firmly held in place. The opening between these plates narrows from a rectangular opening approximately 5 in. square to an elliptical one 6 to 7 in. long and 2½ in. high. The fine coal is delivered by a feed spout at the large end of the die which is steam heated and the plunger gradually forces it through the die. The briquettes, which are 1⅛ in. thick, are delivered apparently in a solid bar but can be readily separated and are forced along a light metal trough by the impulses of the press which makes from 60 to 75 strokes per minute. A crank and flywheel control the length of the stroke and the capacity of the press is approximately 130 tons per 24 hr.

In the Pfennershaft plant near Halle part of the mine output was treated by distillation in muffle furnaces of the shaft type, the distilling chamber being 5 ft. in diameter and 26 ft. high. The brown coal is heaped over the mouth of the shaft, but is prevented from entering the central portion of the shaft by a plate covering the uppermost ring. The space between the walls of the shaft and the cast-iron rings, which are in the inner portion of the shaft, is occupied by the fine coal as it falls down. The gaseous products of distillation pass between the iron rings and into the gas flues leading to the inner space. The combustible gases are used for heating the furnace while the fine coke, which is of approximately pea size, is discharged from the hopper. The coke is used for heating large halls and museums, etc., and is burned in shallow open pans without any flame very much like punk. The tar is used for the production of paraffin and in chemical industries.

CRUDE OIL IN THE CUPOLA

Bradley Stoughton Explains New Process to Newark Foundrymen—Answers Questions

At the February meeting of the Newark Foundrymen's Association, Newark, N. J., held Feb. 2, Bradley Stoughton, secretary American Institute of Mining Engineers, described the system of burning crude oil for cupola melting of which he is the inventor. Details of the process were given in THE IRON AGE of May 13, 1915, and Jan. 20, 1916. Briefly, the system is based on blowing atomized oil into a bed of incandescent coke at the bottom of the cupola through four tuyeres. Matting of the iron above the melting zone, while the iron is in a plastic state, is prevented by thin layers of coke alternating with the iron. These layers of coke not only serve this purpose, but as they drop they replenish the coke which has been consumed, though to a minimum degree, in the bed. The air introduced in the cupola unites by preference with the oil and an excess of air is needed to burn the coke. In his address at Newark, Mr. Stoughton emphasized the point that crude oil cannot be efficiently burned unless there is some source of heat other than that created by the burning of the oil itself. Oil burning cupolas are in operation at Crum Lynne, Pa., and San Francisco, Cal.

DEVELOPMENT REGARDED AS PROMISING

The interest aroused by Mr. Stoughton's address was evidenced by the several questions asked by those present, in reply to which he gave additional details of the process. James Flockhart, Maher & Flockhart, commented that, in view of what had been accomplished with the system in its infancy, its future was promising. Mr. Stoughton said it was hoped to use natural gas instead of crude oil when a plant now building is completed. He did not believe that the use of oil would make melting any slower, but he preferred not to go into this question until a later time. The wear and tear of an oil-fired furnace was about the same as in a cupola using coke only, and no difficulty had been experienced in getting iron as hot as was necessary.

Mr. Stoughton said that anthracite coal had not been tried in connection with oil, but he hoped to make the experiment some day, and believed that the low sulphur content of anthracite might make its use advantageous. It had been found that only a negligible quantity of phosphorus was picked up where oil was used. The quantity of slag was lessened. In reply to a question as to what advantage would be attained with oil when that commodity sells at a normal level, Mr. Stoughton said it had been figured that a saving of 30c. to 40c. per ton might be effected. Further saving might be accomplished by using off-sulphur iron.

He explained that the coke bed requires about 700 lb. When the bottom is dropped, about 300 lb. is recovered. Melting requires about 7½ gal. of oil and 60 lb. of coke per ton, the latter exclusive of that used in the bed. Mr. Stoughton said that an ordinary cupola can be made over at a moderate cost by the installation of the four combustion chambers, and that the most expensive part of the apparatus was the high pressure blower for atomizing the oil. He briefly described devices used for heating the oil which at times becomes necessary. The air and oil enter the cupola at a pressure of 1½ lb.

SAVING IN LABOR AND STORAGE ROOM

The subject of so-called semi-steel was touched on by some of the members, but Mr. Stoughton did not go into the subject, beyond saying that a satisfactory fluidity could be achieved with oil, and that one advantage which would accrue from its use would be the reduction of sulphur, as in the case of ordinary melts. The new system naturally would find its greatest vogue where coke is expensive or oil especially cheap. New England and the Pacific coast are such districts. H. P. Macdonald, Snead & Co., pointed out that a saving in labor would be attained, also that less storage room for coke would be needed, in itself a problem with some foundries.

It was agreed that municipal and insurance regulations governing the storage of crude oil were too severe, often specifying that tanks should be located an unreasonable distance from buildings. By direction of an insurance company a tank in Jersey City was placed 90 ft. from the nearest building, while in New York tanks must be 50 ft. away from buildings if above ground, and 20 ft. if underground. Too many authorities seemed to consider crude oil as dangerous as gasoline.

In the course of a few days Mr. Stoughton expects to have a large cupola at Pittsburgh operating with oil.

New Form of Grinding Wheel Guard

The Ransom Mfg. Company, Oshkosh, Wis., has brought out a new form of guard for grinding wheels. Boiler plate is used for the entire construction, except the adjustable trap at the top, the nut guard and exhaust pipe connection. The outer plate is hinged,

A Boiler Plate Guard for Grinding Wheels Having a Space at the Bottom to Receive the Iron and Steel and Heavier Particles from the Wheel, thus Eliminating Clogging of the Exhaust Pipe

and a box at the bottom catches the heavier particles from the grinding wheel, an arrangement which is relied upon to prevent the exhaust pipe from becoming clogged.

The hinged outer plate allows for changing the wheels or removing the accumulation of sediment from the bottom of the guard. The nut cover for the end of the spindle is a casting.

The guard is designated by the maker as style D and is ordinarily made for wheels ranging from 16 to 24 in. in diameter.

The Nashville Machine Company has purchased the plant and good-will of the Atlas Machine Company, Nashville, Tenn. The consolidation thus effected will make the company one of the largest in its line in the South. T. C. Keeling continues as manager of the Nashville Machine Company, while Thomas Parks, who has conducted the Atlas, will go with the Nashville Company in the sales department. Keith, Simmons & Co., large stockholders of the Atlas Machine Company, recently took over the wholesale hardware business of J. H. Fall & Co., and desire to give all their time to that line.

Of the 157 leading commercial motor-truck builders, eighty-nine use worm-drive trucks, according to the Timken Detroit Axle Company. Of these eighty-nine, fifty-seven use the worm drive exclusively, while fifty-two still continue to make also chain-driven trucks.

The Problem of Anti-Dumping Legislation*

Obstacles to the Enforcement of Pending Proposals—A Bargaining Tariff Needed—The American Position Unique

BY HENRY C. EMERY†

So much confusion exists regarding the nature of dumping and the problem of anti-dumping legislation that a few general propositions must be stated at the outset in order to clear away certain popular misconceptions and to make the real proposition clear. The general feeling seems to be that the practice of dumping is:

1. Something new.
2. Something abnormal and necessarily sporadic.
3. Something immoral or improper.
4. Something which will threaten us with an entirely new and grave danger at the close of the European war.

I submit in reply:

1. That the practice of dumping is as old as the world market.
2. That the practice may be entirely normal and continuous rather than sporadic.
3. That in its ordinary meaning and most general forms it is not immoral nor improper.
4. That the real danger which threatens us after the war is not that European manufacturers will sell goods in our market below their own cost of production but that they will sell goods below our cost at home.

Just a special word on this last point: Sometimes those who speak of European manufacturers "dumping their goods" in our market after the war mean only to indicate the certainty of a great flood of cheap products which may seriously jeopardize our established industries. With that opinion I agree heartily. In fact that danger seems to me so very serious in itself that I think we relatively exaggerate the very special danger that our foreign competitors will "dump" in the technical sense; that is, will sell their goods in this country cheaper than in other countries or their own country.

No "concerted drive" against the United States is necessary. Individual guerilla warfare is enough. Also the foreigner does not necessarily need to sell goods here lower than at home. If he sells them at his home price our manufacturers may still be "up against it." What I say then is not directed to show that a danger does not exist—it is only to show that anti-dumping legislation will not meet the real danger.

FALLACIOUS ASSUMPTIONS—TARIFF AND MONOPOLY

Some years ago somebody not accustomed to business found himself startled by the discovery that American manufacturers were sometimes selling goods abroad at a price lower than that charged to the domestic consumer. So far as I remember, the first excitement was stirred up regarding agricultural machinery. Consequently some conclusions were quickly drawn, which, although entirely erroneous, have endured to an extraordinary degree to the present day. They are to be found both in the reports of commercial organizations and the writings of economists of high reputation. Besides the inferences that such practices were new, temporary and presumably immoral, two other conclusions were drawn at this time:

1. That dumping a surplus product in a foreign country can only take place when the dumping manufacturer is protected in his own country by a high tariff wall.

2. That such a practice can only be carried on by a large trust with a considerable monopoly control of the output.

As a matter of fact neither of these theories holds. Certainly it is not true that a tariff is necessary for this purpose. Long before the problem became one of particular interest to this country it was a regular practice on the part of certain manufacturers in free-trade England. Furthermore it can be carried on as easily by an American manufacturer who is engaged in an unprotected industry as by one who is engaged in a protected industry. Besides the false asumptions of fact as to tariff and monopoly there are deeper ones of theory, primarily two:

(*a*) That a uniform product sells at a uniform price at any given time.

(*b*) That the price of each individual product fluctuates in a continuous relation to its cost of production. The facts are, of course, that a business man sells different portions of the same product at different prices; and where he has a variety of products he sells some close to the cost of production and some at a good margin of profit.

BASIC REASONS FOR DUMPING

We need to recognize that the same principle which is now accepted as entirely proper as a basis for railroad rates is really applicable to practically all lines of business. To be sure, discrimination between shippers has been given up as bad business and bad morals but it is still necessary to make discrimination between different classes of goods without reference to the cost of the service performed; and even in the case of the same commodity it is necessary to discriminate between markets. It is not possible to establish a uniform rate per mile for hauling the same commodity in all directions and in all parts of the country. The reason for this is well known to business men.

We appreciate to-day that the grocer must sell some articles at a large profit and some at no profit at all. He must figure out how on all of his commodities according to the principle of charging what the "traffic will bear," he can make a profit on his total sales. If the producer raises to him the price on sardines he does not (as the old theory supposed he did), raise the price of sardines to the consumer. He may raise, instead, the price of sugar or canned corn to some other consumer.

The woolen manufacturer has to sell a portion of his product at prices which in relation to their cost would be ruinously low if he did not make up for these prices by making unusually good profit on certain other articles. Again it is all a question of what the market will stand.

CANADIAN AND AUSTRALIAN REMEDIES

A new element has been injected into the discussion by the inclusion under dumping of what is called "unfair competition." This has become important as a problem of international policy through the recent recommendations of Secretary Redfield, and through the "Australian Industries Preservation Act." The two practices are closely connected, but it beclouds the issue not to keep them distinct. So far we have considered dumping to mean the common practice of selling a portion of one's goods at prices which would not be remunerative for the whole product.

What is the problem here? We have recognized that in the first place it is entirely proper for A to adopt this policy; in the second place that it is entirely proper for B, if his own business is thereby affected, to oppose it by legitimate means. These facts apply to countries as well as to individuals.

What policy shall this country assume? Much has been said about the legislation adopted in Canada and other British colonies. I assume knowledge of this legislation on the part of this audience. It would be impossible to describe it in detail within the limits of

*Extracts from a paper read at the third National Foreign Trade Convention at New Orleans, Jan. 27, 1916.

†Formerly chairman United States Tariff Board.

this address. On the whole the Canadian practice is the soundest of the experiments yet attempted. It provides for the imposition through order in council of a countervailing duty on goods sold to Canada at prices less than those in the country of manufacture. It has been widely advocated as a model for legislation in this country. The present tariff act as it left the House contained such a provision, which was wisely struck out in the Senate. We must remember that our situation is very different from that of Canada and not jump hastily to the conclusion that we can adopt such a practice outright.

THE AMERICAN POSITION PECULIAR

1. What about our own position in regard to selling surplus products abroad? Do we wish to help start a movement, as yet confined to a few sparsely settled colonies, which will become the practice of our leading competitors? What would be the position of our own export trade if all countries should adopt the principle that goods cannot be sold in foreign markets for less than the established prices of the domestic market?

Note, however, that we are in a peculiar position. In general, our domestic prices are relatively so high that dumping in our market is not so necessary as in other markets. The foreign manufacturer can commonly meet the situation by offering his goods at his regular home prices. On the other hand, prices in foreign markets are so low that the American exporter is largely driven by the sheer force of international competition to sell his surplus at some reduction. For this reason I believe any movement toward a general extension of anti-dumping legislation may prove dangerous to American exporters.

2. There arises also the question whether such legislation is practicable for a country like ours. It is noteworthy that as yet the practice has been confined to a few British colonies, and has not been generally adopted by large nations with manifold lines of industry. In fact those conversant with the origin of the Canadian law know that it was adopted not so much as a general proposition as a specific measure to meet the competition of particular manufactures in this country.

The legislation of New Zealand is aimed at one particular line of manufacture. A policy adopted for very definite ends by a small country with a limited number of industries cannot always be adopted for very general purposes by a country which has a great variety of industries. A few points of difference may be noted:

(*a*) The Canadian machinery of government for this purpose is lacking here. We have always been jealous of executive interference in tariff legislation. In Canada they have the simple device of orders in council with which we have nothing to correspond.

(*b*) The Canadian law has in practice been applied usually to relatively simple cases. It is one thing for the Canadian Government to determine that plows of American manufacture have been sold in that country below the cost charged in the United States, and to determine what the exact difference between the two prices is. Under such circumstances it is easy to add this difference in price to the regular amount of duty.

Consider the very different problem we would have regarding the importation of dress goods. In the first place, these are of such complicated variety that it is extremely difficult to discover whether there is such a thing as an established domestic price for any one of these specialties. In the second place, articles of practically the same nature may be sent us from Germany, France, England or Belgium. In each of these countries there is a different cost of production and a different normal domestic price. The German manufacturer may sell his goods to this country at a price slightly lower than the German price. He may do this to meet the competition of the French manufacturer who is selling the same goods to America at the price charged in France. One may be said to be dumping, the other not. Both, however, are selling at the same price to us.

Can we put an extra duty on the German goods because he has met the French price? If the law were strictly carried out this would be necessary. Apart, however, from the danger of unfair discrimination such an extra duty would be obviously futile. It would simply make it possible for the Frenchman to increase his sales, since, presumably, our own manufacturers cannot meet the foreign price. Such examples might be multiplied innumerably, and much greater complexities be shown.

(*c*) Besides the fact that we import the same goods from such a variety of countries there remains the fact that we both manufacture and import a much greater variety of goods than countries like Canada. Bear in mind that the colonies which have experimented with this idea do not, any of them, much exceed 5,000,000 in population.

I wish to go on record for saying that some application of the anti-dumping principle may probably in the future be made a proper part of a fully elaborated and carefully devised tariff system. I submit, however, that the mere adoption of the Canadian law or any hasty application of this idea will lead to difficulties which will not only completely swamp the administration of customs but may easily work unexpected evils both to our domestic industry and our export trade.

"UNFAIR COMPETITION"

I have referred above to the proposal of Secretary Redfield and to the Australian Act. They both aim at "unfair competition." The Australian Act goes farther than the Secretary in classifying as "unfair" (and hence to be prohibited) imports which would lead to Australian goods being sold at a loss; which would throw workers out of employment, or force them to accept "inadequate remuneration"; or which "would probable create substantial disorganization in Australian industry." In the face of such provisions Nelson Dingley would appear almost a free-trader!

The Secretary goes farther than the Australian Act in that he would make the imports forfeit and visit penalties on the domestic importer: this on the ground that the practice aimed at is "an attempted wrong to be forbidden rather than an economic matter which needs to be restrained." In making such an assumption he has in mind a kind of dumping entirely different from that outlined above or from that ordinarily understood by the term. He has in mind something similar to the so-called unfair practice of a big trust which reduces locally and temporarily its price for the distinct purpose of driving John Jones or James Smith out of business. I agree that such a practice is one which should be prohibited by law if it can be proved to be done for the object of establishing a monopoly.

I submit, however, that the Secretary is wrong in thinking that the chief danger of foreign competition will be found to lie in the action of some foreign monopoly in attempting to ruin some specific American manufacturer. The danger will come in the ordinary course of fierce competition. Let us not confuse the two issues in this regard. Further, there are insuperable practical difficulties to the proposed scheme.

The Secretary's test of unfairness is that of "prices materially below the current rates for such articles in the country of production or from which shipments are made, in case such prices substantially lessen competition on the part of American producers or tend to create a monopoly in American markets."

The claim that their power to compete has been "substantially lessened" would be set up by a host of manufacturers. It is a phrase fraught with much protectionism, and with grave danger to innocent importers. Shall all German dyes be confiscated on arrival? Must the importer on every simple contract investigate the motive of his seller, or ascertain just how "substantially" he is interfering with the competition of home producers? Every importer would have to have a tariff commission of his own. And how about prices at different periods? I contract to-day at prevailing prices for delivery three months hence. The price in the producing country rises in the meantime. Am I liable? If not, is my competitor to be estopped by law from getting the same terms three months hence if he can? One profound objection any lawyer would see at once. The analogy with the domestic law does not hold. In that case it is necessary to show a continuous practice tending toward monopoly. No conviction could be

secured on the basis of a single contract. But in proceeding against the purchaser, it is necessary to hold him liable for a single purchase. The cases are totally different. The offending trust goes free and the customer is penalized for a single, and very likely, quite ignorant offense.

DIFFICULTIES OF APPLICATION

There are plenty of other difficulties. It is impossible to utilize the agents of the Treasury and the Department of Commerce for such a purpose. It is already difficult enough to utilize these agencies for the purpose of establishing foreign values on which duties shall be levied, but mark the great difference. At present the evidence or the investigations of such agents may serve as a basis for valuation. If the valuation on such evidence is raised by 10 per cent the duty is raised proportionately. It is a far different proposition to say that if the statements of our own agents differ by 5 per cent or 10 per cent from the invoices on which goods are sold, that these goods shall be confiscated in toto or that our own citizens who import them shall be subject to fines and penalties as guilty of misdemeanor.

Furthermore, I believe it entirely impossible to distinguish between dumping in this supposedly immoral sense and the other kind of dumping which we recognize as proper among ourselves.

The fact is, as already suggested, that without reducing his price below that of his own domestic market, the French exporter may be able to put goods into this country at such a price as to make the competition of the domestic producer with him very difficult. To meet the price of the French producer the German may have to reduce his price for the American trade below the German price. You may say that by so doing he is doing something immoral. If so why should he not be attended to by the German Government? So far as his effect on American industry is concerned it is exactly the same as that of the French exporter who we agree has done a proper thing.

Is it not our business to have regard to the effect of any action upon our own business rather than to consider the different methods of the two rival foreign exporters in their domestic relations? If the proposed scheme were carried out importer A might buy goods from a French exporter at 75 cents a yard, importer B might buy the same goods from a German exporter at 75 cents a yard, and both might be trying to monopolize the American market. The conduct of importer A would be above reproach. Importer B, however, because the man from whom he bought had a somewhat higher cost of production, would be liable to have his goods confiscated and be subject to fines and penalties.

THE REAL NEED

I have said that a grave danger exists, first to our home industry, second to our export trade. And I have said that I believe that recent schemes as to dumping legislation do not meet the issue. What does? I think the answer is to be found in Mr. Straight's proposition of a "flexible tariff." . . . We must arrange for a bargaining tariff. We must frame our duties so as to be able to make trades by means of mutual concession. Reciprocity treaties in the strict sense will not work and our experiments both in the Payne-Aldrich Act and in the present Act offer little of value. On the other hand a proper study of how to adjust a maximum-minimum tariff to both the traditions of American Government and the conditions of American trade will yield great results.

The twenty-fourth anniversary of the beginning of the manufacture of automatic telephone equipment was celebrated by the employees of the Automatic Electric Company, Chicago, at their annual banquet and dance held at the Hotel La Salle, Jan. 22. The occasion was also an opportunity to honor some 150 employees of the company who had won distinction through making helpful suggestions relative to their work the past year. These men and women were present as guests of the company and special mementoes, in the form of diamond studded rings, gold watches, cuff-links and watch fobs were presented to those whose work in connection with offering suggestions had been most conspicuous.

BRITISH STEEL EXPORTS

A Good Showing in 1915—Four Products Make an Increase over 1913

British exports of iron and steel in 1915, excluding iron ore and including scrap, were 3,250,299 gross tons, against 3,977,468 tons in 1914 and 5,049,090 tons in 1913. The December exports were 259,780 tons, which is the lowest since September and, with that exception, considerably below any month since March, indicating that the prohibition of certain exports was having its effect.

Pig-iron exports for 1915 were 508,540 tons against 668,975 tons in 1914 and 945,262 tons in 1913. Of the 1915 exports Italy and France took the larger part, 119,960 tons and 145,028 tons, respectively. The December exports, 62,174 tons, were nearly equal to those of December, 1913, which were 64,323 tons.

Steel-bar exports in 1915 were 489,464 tons, or nearly double those of 1913, which were 251,059 tons, but only 201,370 tons was exported in 1914. Of the 1915 total France took 349,297 tons; in such a normal time as 1913 only 5253 tons went to France.

Of ferromanganese the total exports in 1915 were about 103,000 tons against 111,000 tons in 1914 and 178,000 tons in 1913.

Rail exports in 1915 were 242,289 tons—less than half those of 1913, which were 500,117 tons. In 1914 the total was 433,507 tons.

In galvanized sheets the falling off in exports in 1915 was 62.5 per cent from 1913, the figures being 286,446 tons and 762,075 tons, respectively. The 1914 exports were 565,984 tons. Tin-plate exports last year were about 25 per cent under those for 1913 or 368,000 tons compared with 494,000 tons.

As compared with 1913, there were only four iron and steel products whose rate of export increased in 1915—plates, black sheets, hoops and steel bars. The increase in plates was 8.9 per cent, of black sheets 44.1 per cent, and of hoops 5.8 per cent.

British imports of iron and steel in 1915, excluding iron ore and including scrap, were 1,295,387 tons as against 2,343,173 tons in 1913 or nearly 50 per cent less. In billets and sheet bars the total 1915 imports were about 440,000 against over 850,000 tons in 1913.

Iron-ore imports in 1915 held up in spite of high freights and navigation dangers. The 1915 total was 6,203,161 tons against 5,704,748 tons in 1914 and 7,442,249 tons in 1913. The imports of manganese ore in 1915 were 20 per cent less than in 1914.

Continental Can Company's Year

The Continental Can Company's income account for the year ended Dec. 31, 1915, compares as follows:

	1915	1914
Net earnings	$1,457,965	$1,339,434
Depreciation and reserve	132,126	110,819
Balance	1,325,839	1,222,614
Preferred dividend	361,725	367,535
Common dividend	200,000	.....
Surplus	$764,114	$855,079

The balance sheet, as of Dec. 31, 1915, shows total assets and liabilities of $16,964,717; cash, $604,476; total current assets, $3,945,988; current liabilities, $1,345,775; profit and loss surplus, $2,009,522.

President Thomas G. Cranwell, in his accompanying remarks to stockholders, says that none of the company's profits can be ascribed to war orders, nor has its business been affected either favorably or adversely by the conditions resulting from the European conflict. An increase in the item covered by real estate, buildings, plant, machinery, etc., in the balance sheet, amounting to $3,893,961, was largely due to the erection of an addition to the tin-plate department at Canonsburg, Pa. He states that the company is increasing this plant from 10 mills to 22 mills and these extensions are now nearly completed. The operation of this increased unit is expected to develop additional earnings for the company and also insure uniformity of tin plate, which, he says, is a very desirable feature of the business.

ESTABLISHED 1855

THE IRON AGE

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The Sluggish Pig-Iron Market

There is no gainsaying the fact that the sluggishness of the pig-iron market in most districts in the past few weeks has surprised the great majority of observers. Periods of relative dullness in pig iron are to be expected, for buying as a rule proceeds in waves or "movements," interspersed with spells of quietness, but no such spell had been predicted for this particular time.

The relation between supply and demand has proved somewhat different from what was expected and it seems clear that the divergence from the expected relation is to be found in the supply rather than in the consumption. The steel works are certainly using all the pig iron that it was supposed they could use, and the foundries are not doing badly. Reference to the monthly blast-furnace report of THE IRON AGE, printed in last issue, shows that the furnaces in blast at the beginning of this month were producing at a rate in excess of 39,000,000 tons a year of coke, anthracite and charcoal pig iron. As has already been pointed out in these columns, the blast furnaces of the country have for months been making more pig iron than it was thought they could make, and fresh occasion for surprise is furnished in the latest figures. Very few of the relatively high-cost furnaces have yet been drawn into the producing ranks. According to our lists there are 107 coke and anthracite stacks idle, a trifle more than one-fourth the total number. Of the number there are, of course, many that are impossible, but not a few others are simply expensive. The production of the active stacks has been really phenomenal.

Perhaps what has been shown, apart from the gain due to better preparation of raw materials in a good many cases and some quietly developed betterment in furnace practice, is that blast furnaces are somewhat more flexible than had been assumed; that they can be pushed harder for tonnage day by day than there was occasion for in 1912-13 and in 1909-10. If so, the question remains whether a price will have to be paid in shorter-lived linings and earlier stoppages for repairs. There has been no such runaway in pig-iron prices as would encourage the refurbishing of stacks that could operate only under the most exceptional conditions, nor is it likely that ore could readily be found for such operation. There is no prospect of the producing ranks being greatly increased, while there are possibilities of the active ranks being thinned by the need of repairs. Too much, however, must not be made of the possibilities of relining requirements. Blast furnaces are relined these days much more rapidly than even a very few years ago, and under existing pressure the period of idleness for relining may be shortened still more. Perhaps the more important factor to be considered is the rapid building of open-hearth steel furnaces, now under construction in rather large numbers, compared with the slow rate at which blast furnaces must be built.

Subsidies Favored at Boston

Notwithstanding the widespread prejudice against any scheme of subsidizing American shipping, vigorous advocates of this method of assisting in the development of our merchant marine persistently present themselves. The latest movement in this direction has been launched under the auspices of the Chamber of Commerce of Boston, Mass. Its special committee on merchant marine, of which Elwyn G. Preston is chairman, has made a report, which was given to the public Feb. 4.

This report is an exhaustive document. Statistics are given showing the records of American shipping from 1789 to 1914, records of the merchant tonnage of the principal nations and a summary of foreign subsidies and bounties. The report sets forth that after the Revolution, when most of our ocean carrying trade was in the hands of English shipowners, Washington, Jefferson and their colleagues provided a 10 per cent discount of the tariff duties on all goods imported in American vessels, gave preference in the East India trade and allowed American vessels marked preference in tonnage duties, by means of which a great merchant marine was established. It sets forth that, although this preferential shipping policy was gradually relaxed after the war of 1812, it was not completely abandoned until 1850. British subsidies had then for many years run from $3,000,000 to $4,000,000 annually, and while the preferential policy of Washington and his colleagues had made American shipping the most prosperous in existence, the United States Government for a time resolutely met subsidy for subsidy. But in 1855, when the American merchant marine in foreign commerce had reached its climax, all bounties were abandoned. Though the tonnage nominally registered did not

immediately show a decrease, American shipbuilding fell from 583,450 tons in 1855 to 156,602 tons in 1859 and rallied to only 214,797 tons in 1860. One by one the American lines running across the Atlantic succumbed, and when the Civil War opened in 1861 only occasional American steamships were running to Europe. The foreign lines subsidized by their governments had won the fight.

The committee rejects Government ownership and operation of merchant vessels and recommends that carefully guarded subsidies be granted by the Government sufficient to offset the difference in cost of operation between American and foreign vessels, with the condition that all vessels receiving subsidies be so constructed as to render effective service as transports, fuel ships, supply ships or ammunition ships in case of war and be subject to the call of the Government. It further recommends an increase in the rates of compensation offered under the ocean mail law of 1891 to regular steamship services carrying mail, the creation of a Federal Shipping Board, similar to that of the British Board of Trade, and a revision of our navigation laws and regulations. The report emphasizes the importance of encouraging shipbuilding, and to this end urges the establishment of a thoroughly American inspection, survey and classification so that it may be possible to effect adequate insurance in American companies to which preference should be given by American shipowners and merchants. Setting forth the necessity of an adequate merchant shipping for our military and national defense, the report states that "the country has not forgotten the humiliation of seeing its proud battleship fleet escorted around the world by a motley fleet of British, Dutch and Italian colliers because no American vessels were to be had." Apropos of the most prominent question now before the nation, it points out that "a strong mercantile marine is one of the great essential elements of American 'preparedness.' "

This document, coming as it does from the business and intellectual center of New England, will undoubtedly receive attentive consideration from those interested in public questions. The courage of the Boston Chamber of Commerce, in taking up what so many have come to regard as a dead issue, and presenting it to the public as a thoroughly live topic cannot fail to attract a hearing. The arguments presented are cogent, and the array of facts is convincing. The document comes opportunely, as the shipping question is now very much to the front in Congress.

While the report recommends the creation of a Federal Shipping Board, the fact cannot be overlooked that, as set forth in the *Wall Street Journal* of Feb. 7, the possibility of danger to our great railroad systems is imminent in a measure of this kind, unless most carefully drawn. The shipping bill fathered by the Administration authorizes the proposed Federal Shipping Board "to determine and prescribe through routes between and over such rail and water lines, and just and reasonable joint rates or charges to be demanded and collected for the transportation of property over such routes" and that "the Board may prescribe preferential rates covering the transportation aforesaid, if, in its judgment, such rates are necessary in order effectually to carry out the purposes of this act." The *Journal* asks to what extent may the Board consider it necessary to reduce export rail rates so that the through rail-and-water rate via the American lines shall draw tonnage to their vessels? It states that "so far as export and import rates are concerned the jurisdiction of this new Board, which is likely to be composed of men who know little about railroad rates and operation, will be substituted for that of the Interstate Commerce Commission. In the matter of these rates the railroads will be practically at the mercy of the Shipping Board. Their only recourse will be to their constitutional rights forbidding confiscation—a long drawn out and expensive process of defense." It therefore appears that it would be possible to clothe a Federal Shipping Board with too much power. Care should be taken that in the effort to improve the conditions of one set of business interests no invasion be made of the rights of another set.

Shall We Conserve Our Capital?

As a tariff commission is undoubtedly to be created, there is occasion for the most careful and exhaustive thought as to what the commission should do. We venture to suggest that the seriousness of this question has not thus far been generally apprehended. Wearisome have been the "hearings" held by the House and Senate committees when a tariff bill was in the making, and the first thought naturally has been that a commission would serve a very useful purpose should it gather the facts which these committees have failed to gather and properly co-ordinate, but to launch a commission with blanket instructions to "gather all the facts" would be the height of inefficiency. The facts are very numerous, and no commission, however hard it worked, could ever at any instant have its information even approximately up to date. It is quite elementary that, to make the commission at all efficient, some instructions should be given as to which classes of facts should be gathered first.

It will readily be admitted that, given any set of facts, a Democratic Congress would enact a different tariff law from that of a Republican Congress, and thus it is reasonable to infer that the instructions to a commission, in advance of its undertaking its work, would differ according to the political complexion of the Congress that formulated the instructions, and this irrespective of the condition, which both parties promise, of the commission itself being non-partisan. This, however, does not discourage consideration of the subject. There is at least some measure of sincerity in the expressed desire to "take the tariff out of politics" and that means that the parties would not necessarily be so very far apart in formulating instructions for the commission.

In this connection there is one very important point, and one which in its present aspect is so new that there can be no possible excuse, on account of precedent, for making it a partisan issue. The point is that the fortunes of war have been bringing capital to the United States. Europe has been parting with capital, and will part with more of it while the war lasts, in sending us gold, in floating govern-

ment loans in the United States, in selling American securities in our markets, and in other ways, as for instance when the English-owned American securities now being mobilized by the British Government are put to use.

Clearly a very important economic problem before us is to conserve this capital. As it is the European war that has forced this movement, the termination of the war may witness a tendency for our acquired capital to flow away again. While we are not responsible for the conditions which are making it come our way, we should be very foolish to let ourselves be drained of it. By whatever means we may find in our power we should endeavor to fix the condition existing at the end of the war as to this capital. Therefore, in studying how a tariff commission should be instructed the most careful attention should be given to this fact, that a large amount of capital has come to us, through an altogether new economic influence, and we should keep it.

The point is a practical, not a theoretical, one. It may be urged that if a tariff commission studies and reports upon labor conditions at home and abroad, and conditions as to the return upon capital, with the various other matters that we have grown to connect with the general subject of the tariff, the end could be accomplished; but the practical point is that the facts are very numerous and cannot all be gathered in time to be useful, so that a definite plan, a fixed viewpoint from which to select the facts first to be gathered, is of prime importance. The practical way to conduct the investigation is to formulate that policy which will promise the largest number of facts, in the shortest possible time, and, especially important, the most useful facts.

That this is a new viewpoint in tariff making can scarcely be questioned. Foreign ownership of capital investments in the United States has come about under both high and low tariffs. Neither political party has made a strong issue that such investment should be encouraged or discouraged. The condition has been allowed to grow as it would, and perhaps it is as well, up to this time, that such has been the case. The development, however, brought us to a point at which a very considerable proportion of the physical wealth within our borders was owned abroad. To settle the returns due upon this wealth we have exported merchandise in excess of our imports. Very probably we are better off thus far. It is quite likely that if this thing had not occurred less material wealth would have been created. In the final analysis it was not a case of wealth being created by us and the title then being handed to some one outside our borders, it was rather that the foreigner helped to create the material things—railroads, manufacturing establishments, etc.—and simply kept the title. Now that the titles to these things are coming to us, together with titles to foreign wealth, we should endeavor to keep them by all economic means that we may find in our power. To study what those means may prove to be is one of our most important duties at this time, and if a tariff commission is created the instructions given it should include a special injunction to look out for all facts that may bear upon this point.

Our Great Steel Export Movement

The war has caused many surprises, but perhaps none has been more striking than its effect, direct and indirect, upon our exports of iron and steel. THE IRON AGE has published export data from time to time as to individual iron and steel products, and the showing of increases has been impressive. The tonnage items, leaving out machinery, cars, automobiles, locomotives and other products in which iron and steel are important, reached high point at 401,000 tons in August, and for September, October and November fell off to about 370,000 tons a month, due to vessel scarcity. In the table below the principal tonnage products are given in the order of the percentage of increase in the monthly average exports, comparing the ten months of 1915 with the same period in 1913, a year free from war influences.

Exports of Iron and Steel Products in 1913 *and* 1915

	10 Months to Nov. 1, 1913, Gross Tons Per Month	10 Months to Nov. 1, 1915, Gross Tons Per Month	Percentage of Increase	Average per Month for Aug., Sept., Oct., 1915, Gross Tons
Ingots, billets and blooms	8,856‡	45,130	412.2	62,440
Barb wire	6,676*	19,280	190.0	24,448
Total of barb and all other wire	15,774†	37,774	137.5	45,498
Tin plates	5,292	12,203	130.0	20,377
Steel bars	19,257	33,761	76.3	40,006
Iron bars	1,913	2,998	57.0	4,928
Sheets and plates	35,452	41,526	16.0	43,535
Steel rails	41,312	29,237	....	55,294
Steel plates	20,166	18,602	....	25,865
Pig iron	23,385	17,814	....	23,000

*Exports in the fiscal year 1912 were 8,600 tons per month.
†Exports in the fiscal year 1912 were 20,340 tons per month.
‡Exports in the fiscal year 1912 were 19,532 tons per month.

The very large expansion in the outward movement of ingots, billets and blooms, an increase of more than 400 per cent over the 1913 period and of 131 per cent over the previous record exports in 1912, is the feature of the movement, greatly exceeding the outgo in steel bars or even barb wire. Tin-plate exports also take a prominent place in the list. Of particular interest are the figures for the last three months of published comparative statistics, every product except pig iron showing a rate exceeding that for the 10-month period of 1913.

A study of the statistics shows that in some cases the movement of these exports is in surprising directions. In rails, tin plates, and iron and steel plates, the increase is largely in trade channels that lead not to the warring nations but to neutral countries, as in South America and the Orient, which formerly obtained their supplies from Europe.

Oxford furnace of the Empire Steel & Iron Company at Oxford, N. J., was blown out Jan. 22 for relining, which will require about 60 days. The furnace was blown in June 7, 1912, and made the best campaign in its history, the total output being 272,777 tons of basic pig iron, an average of 210 tons a day. It was operated exclusively on ores mined by the company at Oxford and Mount Hope, N. J. The furnace is 11 x 16 x 80 ft. The company intends to rebuild the stack and add a hoist and automatic charging equipment, but these changes have been deferred on account of the present active market for pig iron.

CORRESPONDENCE

How to Typewrite for Reproduction

To the Editor: To make good typewritten copy for reproduction purposes remove the ribbon from the typewriter and write directly on the back of black carbon paper instead. One will thus get a perfectly clean outline of the type which cannot be obtained through a ribbon because the weave in the ribbon always shows to some extent. There is no weave in the carbon paper.

The principal objection to this method is that the writer cannot see the copy as it is being written, but an experienced typist will make no mistakes anyway.

W. F. SCHAPHORST.

New York City.

On High Sulphur in Steel

To the Editor: In a paper entitled "An Investigation of the Effect Produced by Varying the Sulphur Content of Basic Open-Hearth Steel," presented by Dr. J. S. Unger at the annual meeting of the Society of Automobile Engineers in New York, Jan. 6, 1916, the author concludes from the results of a series of tests that steel containing less than 0.10 per cent sulphur is not necessarily bad. Dr. Unger carefully qualifies his statement, however, by the words "not necessarily bad." This brings up the point as to when it is bad and when it is not bad. Granting that steel of such high sulphur content is satisfactory a large percentage of the time, how would the consumer be able to ascertain before using which stock is satisfactory and which is unsatisfactory? Surely a chemical analysis would not enlighten him. Neither would a solution of the matter through microscopic examination prove practical and commercial. On the other hand, the consumer could not afford to work up such material with the idea of separating the good from the bad after manufacture.

In the tests made by Dr. Unger sulphur additions were made in the pure powdered form to the ingots during pouring, these ingots being poured from heats from which the original impurities in raw materials had been worked down considerably lower than prevailing commercial limits. The question arises as to what difference should be expected between high sulphur steel on the one hand, where the sulphur is an unremoved impurity originally existing in impure raw materials (which are not sufficiently worked to be purified) and, on the other hand, high sulphur steel, in which the impurities are greatly reduced through excellent melting conditions, and in which high sulphur exists through additions to the previously purified metal.

In Dr. Unger's tests but fifty tons of steel out of 100 tons cast was used for specimens. A natural assumption would be that the stock was practically all taken from the lower half of the ingot. On this basis Dr. Unger's tests were made from a product with not less than 50 per cent croppage, which would be considered as a selected grade and not typical of commercial practice.

An investigation of the form in which the sulphur exists in the steel and of its distribution is of considerable moment. Without doubt in these tests the formation of sulphides was such that the properties of the metal were least affected. Further investigation with the microscope would be welcomed. Before sanctioning the commercial use of high sulphur steels it seems necessary to complete a long line of research work, beginning where Dr. Unger left off. First, it is necessary to determine in just what condition the sulphur must exist without having deleterious effects on the properties of the metal. Second, after ascertaining this condition, it is necessary to perfect melting conditions in the steel plant such as will secure the commercial attainment of this condition and production of metal with high sulphur so combined that its presence will not be harmful under most adverse conditions in any heat.

Until the steel making process has reached such a degree of advancement and perfection we cannot see from the consumer's standpoint the justification of inflicting upon him high sulphur steel, although from the steel manufacturer's standpoint it would doubtless be an advantage in offering a means of working up high sulphur raw materials.

M. H. SCHMIDT,
Metallurgical Engineer United Steel Company.
Canton, Ohio, Jan. 29, 1916.

Conditions in Australia

Some light on conditions in Australia are obtained from a personal letter received from the president of a large establishment in Victoria, Australia, building steam power plant machinery, air compressors, locomotives, dredging plants, etc. Business has been disorganized not only by the loss of men who have gone to the front, depleting the ranks of skilled workmen as well as general classes of labor, but by a serious shortage of raw materials. Business is hampered also by freight rates, which have, for example, risen from 19s. per ton on machinery before the war to 125s. by Dec. 15, the date of the letter. Material usually obtainable from England in about three months from the time of ordering now takes nine to twelve months. Stocks are now low. Metal working plants are actively engaged in the manufacture of shells and other munitions, and this fact has, of course, upset the balance among the different departments of machinery plants.

Australia has had a bounteous harvest, and while good prices are ruling, there is difficulty in getting space in steamers and ships to carry the products to the other markets of the world. The government has taken a hand and devised a plan whereby the whole of the season's productions have been pooled, the producer getting a fixed advance with a final adjustment to be made after the season's business is finished. This is calculated to put both the large and the small producers on the same footing.

Labor troubles are aggravated, as the labor organizer receives an increase in his salary above what he gets in normal times. So it is that employers regard it as an advantage for these organizers to have some sort of a strike on. In the State of New South Wales there were 300 odd strikes in the last twelve months in spite of arbitration acts and state factory legislation to control troubles of this kind. The manufacturer writing says that fully half of his time is taken up attending conferences in which conditions and wages are arranged on behalf of the trade in the State of Victoria. The committee settles on rates of pay and conditions and these are gazetted and become the law of the country. All employers are bound to abide by the conditions laid down, and though the representatives of the men have equal say in fixing the conditions, when it suits them, these representatives call a strike.

Federal Trade Commission's Work

The Federal Trade Commission, Washington, D. C., announces that investigation of the first 30 charges of unfair competition in business brought before it had developed no cases in which it was considered necessary to issue a formal complaint. Formal complaints, it was said, would be issued soon, however, in other cases now under consideration.

In all the 30 cases of alleged unfair competition the concerns accused agreed to cease illegal practices, or else inquiry showed that no unfair competition existed. The charges made in the various cases included misbranding, unfair advertising methods, boycott, coercion, refusal to sell, unfair use of corporate name, exclusive agencies, underselling, and patent law violations.

Any formal complaints issued by the commission will order the concern accused to appear and show cause why its trade methods should not cease. The commissions' decisions will be subject to court review on questions of law but not on questions of fact.

TARIFF COMMISSION BILL

Predictions that It Will Become a Law at This Session

WASHINGTON, D. C., Feb. 8, 1916.—The movement for the creation of a non-partisan tariff commission, which has recently been strongly urged by business men in all lines, has been fairly launched by the introduction in the House of a bill approved by the President and his advisers on commercial subjects. The author is Representative Rainey, of Illinois, the ranking Democratic member of the Ways and Means Committee, and it is the best opinion here that the bill will become a law before the end of the present session. The bill provides for the creation of a commission of five members, not more than three of the same political party, to be appointed for two, four, six, eight and ten years, respectively, their successors to serve full terms of ten years except those chosen to fill vacancies. No one is eligible for appointment who has served in the House or Senate and no member may engage in any other business or employment. The President may remove a member only for inefficiency, neglect of duty or malfeasance in office. Commissioners will receive salaries of $12,000 per annum and the secretary a salary of $6,000, and the necessary staff of special experts, examiners, clerks and other employees is authorized.

It is made the duty of the commission to investigate the administration and fiscal effects of the customs laws of this country, the relations between the rates of duty on raw materials and finished or partly finished products, the effects of ad valorem and specific duties, and all questions relative to the arrangement of schedules and classification of articles in the several schedules of the tariff law, including their relation to the Federal revenues. The commission is also clothed with power "to investigate commercial treaties, preferential provisions, the volume of importations compared with domestic production, and all conditions, causes, and effects relating to unfair competition of foreign industries with those of the United States, including dumping." This provision regarding dumping is accepted here as foreshadowing the abandonment of any further attempt to legislate with reference thereto at the present session.

Unusually broad powers are conferred upon the commission and these have caused some criticism. Section 7 provides as follows:

> Sec. 7. That for the purposes of this act the commission or its duly authorized agent or agents shall, for the purposes of examination and investigation at all reasonable times, have access to and the right to copy any documentary evidence of any person, firm, copartnership, corporation, or association engaged in the production, importation, or distribution of any article under investigation; and in such connection said commission shall have power to summon witnesses, take testimony, administer oaths, and to require any such person, firm, copartnership, corporation, or association to produce books or papers relating to any matter pertaining to such investigation. Any member of the commission may sign subpoenas, and members and agents of the commission may administer oaths and affirmations, examine witnesses, and receive evidence.

The attendance of witnesses and the production of documentary evidence may be required under the terms of the bill "from any place in the United States at any designated place of hearing," and in case of disobedience to a subpoena the commission may invoke the aid of any court of the United States in requiring the attendance and testimony of witnesses and the production of papers. Elaborate machinery is provided to enforce writs of mandamus and penalties are expressly provided for perjury.

The commission is authorized to act in conjunction and co-operation with the Treasury Department, the Department of Commerce, the Federal Trade Commission or any other departments, all of which are required, when directed by the President, to furnish the commission on its request all records, papers, and information in their possession relating to any of the subjects of investigation. It is understood that an amendment will be urged prohibiting the commission from making public any information so received.

The commission is required to report to Congress from time to time the results of its investigations and to "put at the disposal of the President of the United States, the Committee on Ways and Means of the House of Representatives, and the Committee on Finance of the Senate all information at its command, and shall make such investigations and reports as may be requested by the President or by either of these committees." The creation of the commission will eliminate from the Bureau of Foreign and Domestic Commerce the tariff work now being done by that Bureau and will also relieve the Federal Trade Commission of any similar function.

It is understood that the Ways and Means Committee will give hearings on the tariff commission bill, but that only a short time will be devoted to this purpose as an early report on the measure is desired.

W. L. C.

Whitaker-Glessner Company's Year

The annual report of the Whitaker-Glessner Company was presented at the annual meeting of its stockholders held in the general offices in Wheeling, W. Va., Feb. 2. The volume of business done by the company in 1915 was in excess of $12,000,000. The profit and loss account was as follows: Balance Jan. 1, 1915, $2,053,806.57; gain during year 1915, $1,025,188.84; dividends paid, $265,103.61; increase, $760,085.23; balance Jan. 1, 1916, $2,813,891.80. The reserve accounts were increased $753,665, making the balance in these accounts $1,710,241 at the beginning of 1916.

Dwight H. Wagner was elected a director to fill a vacancy caused by the death of William L. Glessner. The remaining directors were re-elected for the ensuing year. Officers were elected as follows: Alexander Glass, president; A. C. Whitaker, E. C. Ewing and Andrew Glass, vice-presidents; N. P. Whitaker, secretary; G. W. Hocking, treasurer.

A quarterly dividend of 2 per cent on the preferred stock was declared, payable March 1. The company has decided to build an open-hearth steel plant at Beech Bottom, near Wheeling, to contain at the start four 75-ton furnaces and blooming and sheet-bar mills. Julian Kennedy, Pittsburgh, will be consulting engineer, and active work will start shortly.

Baltimore Sheet & Tin Plate Company

A press dispatch from Baltimore, Md., states that an issue of $1,500,000 7 per cent cumulative preferred stock of the projected Baltimore Sheet & Tin Plate Company, underwritten by a syndicate headed by the Fidelity Trust Company of that city and Aldred & Co., New York, was offered publicly on Monday. The entire issue of 15,000 shares was sold. The offering was one of the most successful that has been made in Baltimore for some time. The price was $97 and the purchase of each share of preferred stock carried one-fourth share of common stock. J. M. Jones has been elected president of the company. He was formerly vice-president and general manager of the Massillon Rolling Mills Company, Massillon, Ohio.

Snyder Electric Furnaces in Great Britain

The Snyder Electric Furnace Company, Chicago, announces that its European agent, G. J. Stock, inventor of the Stock converter, has sold two more Snyder furnaces to steel companies. The National Steel Foundry Company, Ltd., Scotland, has contracted for one furnace having a capacity of 6 tons per 24 hr., while Thwaites Brothers, of England, will install one more furnace, having a capacity of 12 tons per 24 hr., making two of this capacity. The above furnaces make a total of five of this type now operating or contracted for in Great Britain.

McFadden Brothers, Philadelphia, and Rogers Company, Norfolk, Va., are reported as planning to build a cotton compress and warehouse at Augusta, Ga., to cost $250,000.

AN ARMOR PLATE PLANT

Senate Bill Authorizing the Government to Build or Buy

WASHINGTON, D. C., Feb. 8, 1916.—The Senate Committee on Naval Affairs to-day, by a vote of nine to three, authorized a favorable report upon a substitute for the Tillman bill appropriating $11,000,000 to be expended in the erection by the Government of a factory for the production of armor plate. Senators Tillman of South Carolina, Swanson of Virginia, Bryan of Florida, Johnson of Maine, Chilton of West Virginia, Phelan of California, Pittman of Nevada, Clapp of Minnesota and Poindexter of Washington voted in favor of the bill, while Senators Penrose of Pennsylvania, Lodge of Massachusetts and Smith of Michigan opposed it. The substitute bill provides as follows:

That the Secretary of the Navy is hereby authorized and directed to provide, either by the erection of a factory, or by the purchase of a factory, or both, for the manufacture of armor for the vessels of the Navy; said factory or factories to have an annual capacity of not less than 20,000 tons of armor; and the sum of $11,000,000 is hereby appropriated out of any money in the Treasury not otherwise appropriated to be immediately available for the purposes of this act.

Chairman Tillman has given notice that he will call the bill up at the first opportunity and predicts its early passage in the Senate.

The action of the Naval Committee brings to a sharp issue the controversy over the price of armor plate and renders highly significant the notice served upon Chairman Tillman and his colleagues by President E. G. Grace of the Bethlehem Steel Company, who, at the hearing on Feb. 1, made the following statement:

In the event of the United States Government's creating a Government armor-plate plant, I realize it immediately renders useless all private plants, and just as soon as legislation is passed authorizing the Government plant, I shall immediately recommend to our stockholders and board of directors that necessary steps be taken to provide for the amortization of the investment in our plant by the time the Government plant can be put in operation.

President Dinkey and Vice-President Barba of the Midvale Steel Company were present and apparently indorsed Mr. Grace's statement. Assuming that the program for the national defense is carried through on the basis calling for 125,000 tons of armor plate in the next five years, that this amount is equally divided among the three existing plants and that the Government is able to produce armor of acceptable quality in four years, it would follow that the Bethlehem Steel Company in its amortization plan must wipe out its investment of $7,500,000 at the rate of $1,875,000 per annum, which, prorated over 8000 tons of annual output, would involve an increase in price of over $225 per ton which, added to the present price of $425, would bring the cost of armor to the Government upward of $650 per ton. Of course, if any of the armor manufacturers should succeed in obtaining foreign contracts these figures would have to be readjusted.

Senator Penrose, in reference to the same subject, announced that if the Government decided to embark in the manufacture of armor plate the private makers, realizing that their plants would be reduced to scrap, would decline to make armor for the Government at the prices heretofore proposed, but would add $200 a ton to the price on all armor hereafter turned out by the private plants. Senator Tillman, commenting on this statement, declared to-day that the "threat of the armor barons will not affect Congress," and that in time of trouble the Government "could seize their plants and operate them by right of eminent domain."

W. L. C.

The plant of the Rockford Milling Machine Company and the Rockford Tool Company, Rockford, Ill., is being extended to about double its present length. This is the second substantial addition undertaken in the period of a year. Preparations are being made to manufacture an 18-in. heavy-duty lathe.

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STEEL MERGER CHANGES

Cambria, Lackawanna and Youngstown Sheet Project Dead—Midvale Buys Cambria

The steel trade was electrified on Monday of this week by the announcement that the Midvale Steel & Ordnance Company had acquired a controlling interest in the stock of the Cambria Steel Company at $81 a share and would pay that price for the remainder. The first public information of this unexpected turn came in the following statement made at Philadelphia Monday morning by Edward T. Stotesbury, William H. Donner and J. Leonard Replogle, who, with his Pittsburgh associates, recently acquired a large block of the Cambria stock:

> While it is true, as reported, that the negotiation for the combination of Cambria Steel with other steel companies has been abandoned, it is desirable that the stockholders should be advised immediately that other negotiations looking to the sale of the stock have been virtually consummated at $81 per share in cash. It is expected that a formal announcement will be made very shortly.

In the morning papers of Feb. 6 the statement was made on authority that Kuhn, Loeb & Co. and the National City Bank, New York, had dropped their plans for underwriting the consolidation of the Youngstown Sheet & Tube Company, Cambria Steel Company and Lackawanna Steel Company, and that it was understood the merger plans would not be carried through at this time. To the same effect was the following statement made at Youngstown, Ohio, by James A. Campbell on Monday, Feb. 7:

> The merger of the Cambria Steel Company, Lackawanna Steel Company and Youngstown Sheet & Tube Company has been called off for the present, for the reason that J. A. Campbell, president of the Youngstown Sheet & Tube Company, was unwilling to purchase the stock of these companies unless practically all the stock of each could be secured, which was not feasible at present.

THE MIDVALE COMPANY'S STATEMENT

On Wednesday, Feb. 9, as THE IRON AGE went to press, the following statement was made by officers of the Midvale Steel & Ordnance Company, New York:

"The Midvale Steel & Ordnance Company announces that it has made a contract with Messrs. Stotesbury, Donner and Replogle for the acquisition of so much of the stock of the Cambria Steel Company at $81 per share as may be deposited with Drexel & Co. by Feb. 19, 1916. This purchase will be financed in the following manner:

"A. The Midvale Steel & Ordnance Company will issue and sell to the Guarantee Trust Company and Lee, Higginson & Co. $50,000,000 of its 20-year 5 per cent collateral trust sinking fund bonds, convertible into the company's stock at any time at $100 per share.

"B. The company will issue and offer to its stockholders at $60 per share its $25,000,000 of treasury stock, which offer has already been underwritten by a syndicate."

The authorized capital stock of the Midvale Steel & Ordnance Company is $100,000,000, of which $75,000,000 has been issued.

CAMBRIA COMPANY'S HISTORY AND EXTENT

The Cambria Steel Company was incorporated in 1898 and leased for a period of 999 years from Dec. 1, 1898, the property and franchises of the Cambria Iron Company. It pays a rental of 4 per cent per annum on $8,468,000 capital stock of the lessor company, and $5,000 per annum for organization expenses. The works at Johnstown, Pa., include eight blast furnaces, four Bessemer converters and twenty-eight open-hearth furnaces, capable of an annual production approaching 1,500,000 gross tons of ingots. It has full ownership in the Penn Iron Mining Company, Michigan, and part ownership in the Mahoning Ore & Steel Company. It owns four coal mines and has half ownership in the Cambria Steamship Company and the Mahoning Steamship Company and the Juniata Limestone Company, Ltd.

The company has a notably wide range of products, in part as follows: Rails from 8 lb. to 150 lb. per yard, and general track accessories; steel axles for passenger as well as freight cars; steel bars, structural material and plates; railroad and mine cars, particularly those of practically all steel construction; a wide variety of agricultural steel and shapes, including disks for harrows, rake teeth, plow steel, etc.; wire, nails and wire fencing; bolts, nuts and rivets; crank pins, piston rods and steel forgings; tire, toe calk, carriage spring and other steel, etc. Its rolling equipment comprises in part four blooming and slabbing mills; ten rail, structural, plate and billet mills; thirteen merchant bar mills and one wire rod mill. Besides its steel car shop and the bolt and nut plant, it has two forge and axle departments, two splice bar plants, five shops for finished steel products and seven for finished wire products. The 372 by-product coke ovens are provided with a recovery plant for tar and ammonia. The annual capacity of the plant is regarded as 1,000,000 gross tons of finished steel; shipments in 1912 amounted to 1,038,634 tons and in 1913 to 1,062,737 tons.

The net income of the company for late years has been as follows: 1910, $4,553,333; 1911, $2,777,339; 1912, $3,411,083; 1913, $6,234,950; 1914, $1,960,990. Of the $50,000,000 capital stock, $45,000,000 is outstanding.

German Steel Syndicate's First Year of War

The annual report of the German Steel Works Union for the fiscal year ended June 30, 1915, recently made public, shows total shipments of 3,393,537 metric tons against 6,124,310 tons in the preceding fiscal year, or 55.41 per cent of the latter. The domestic trade absorbed 80 per cent of the 1914-15 total, the foreign sales being necessarily restricted because of the war. The average daily shipments were 11,109 tons as against 20,098 tons in the fiscal year of 1914 and 21,104 tons in 1913. The daily rate fell from 17,423 tons in July, 1914, to 3653 in August on the breaking out of the war, but increased to 12,305 tons in June, 1915. The shipments for the fiscal year 1915 were 739,451 tons of semi-finished steel against 1,639,829 tons in the year previous; 1,759,115 tons of railroad material against 2,748,728 tons and 894,971 tons of shapes against 1,735,753 tons.

Exports of galvanized iron and steel sheets and plates from the United States are very large despite the high price of zinc. For August, September and October, 1915, they were at the rate of 6439 gross tons per month or 77,268 tons per year. For the first 10 months of 1915 they were at the rate of 6785 tons per month. The record exports were in the fiscal year 1913 when they amounted to 114,650 tons or 9554 tons per month.

The Committee of Management, International Engineering Congress, 1915, announces that the volume on mechanical engineering is ready for distribution and the members who have subscribed for this volume will soon receive it. It is hoped that within two months the entire set will be completed. W. A. Cattell is secretary, 425 Foxcroft Building, San Francisco, Cal.

The Snyder Electric Furnace Company, Chicago, is building an electric furnace testing plant and laboratory at a cost of $50,000, to be completed in about 60 days, which will afford facilities and equipment for the commercial and scientific development of electric furnace problems. The plant is to be located in the Clearing district, Chicago.

Pittsburgh and Nearby Districts

Numerous employers in this section, including the coke regions, have advanced wages 10 per cent, effective Feb. 1.

The National Steel Casting Company, organized recently with a capital of $100,000, has made plans to build a modern steel casting plant at New Cumberland, Hancock County, W. Va. The main foundry and machine-shop building will be of steel construction, 165 x 300 ft., and will contain a 15-ton open-hearth steel furnace and a small electric furnace with all auxiliary equipment. A brick pattern shop, 30 x 100 ft., will also be erected. The plant is expected to make from 200 to 300 tons of steel castings monthly. E. E. Kramer, formerly with the Heyl & Patterson Company, Pittsburgh, is president of the new company, and Joseph Halbe, formerly with the Reliance Steel Casting Company at Pittsburgh, is superintendent. The company will maintain a general sales office in Pittsburgh.

The Driggs-Seabury Ordnance Corporation, Sharon, Pa., started work this week on the manufacture of 500 3-in. guns for the British Government. The contract is said to amount to about $1,500,000.

F. L. Fay, Greenville, Pa., who has purchased much stock in the Greenville Steel Car Works, has been made president, succeeding Fletcher Goodwill, of Jamestown, N. Y. James C. Dimmick, Greenville, succeeds F. P. Hall as vice-president. This company has recently spent nearly $1,000,000 in plant improvements and extensions, and in addition to the rebuilding of steel cars will build new steel cars.

The American Steel & Wire Company recently purchased the property adjoining its Shoenberger works, Pittsburgh, which was formerly occupied by the S. Jarvis Adams Company, and will likely use it for future extensions.

A verdict in favor of the Jones & Laughlin Steel Company was rendered Feb. 7 in the civil suit in which a woman sought to recover $15,000 damages alleged to have been caused to her property from fumes and clouds of ore dust emitted from the furnaces of the company. The verdict is an important one for the company, as many similar suits were to be entered by property owners in the neighborhood of the furnaces had the case gone in favor of the plaintiff.

The LaBelle Iron Works, Steubenville, Ohio, is reported to have taken another order for 25,000 or more large shells for the Allies.

The Valley Mold & Iron Company, Sharpsville, Pa., has completed large additions to its plant and is now turning out between 1400 and 1500 tons of ingot molds per day. The Alice blast furnace, owned by this company, is now in operation, making 300 tons of basic pig iron per day, which is taken by W. P. Snyder & Co., Pittsburgh, who in turn furnish the Mold & Iron Company all the Bessemer iron used in making ingot molds.

The Carnegie Institute of Technology, Pittsburgh, has started a course of instruction in the elements of the coal tar industry. The course will consist of a series of lectures by Prof. J. H. James, head of the department of chemical engineering. The class meets in the evening, and a great many employees of iron and steel plants in the district have enrolled as members.

No. 3 blast furnace at the Ohio works of the Carnegie Steel Company, Youngstown, Ohio, was put in blast last week, after being relined and repaired. All six stacks at this plant are now in operation, making close to 3500 tons of pig iron per day, all of which is used in the steel works at this plant.

The Princess Motor Car Company, Pittsburgh, has been granted a Delaware charter, with a capital of $1,000,000, to manufacture, sell and deal in motor cars, trucks and accessories. Incorporators are Isaac N. White and Frank W. Barbee, Pittsburgh, and Ola C. White, Detroit, Mich.

The annual banquet of the Engineers' Society of Western Pennsylvania was held in Memorial Hall in that city, on Monday evening, Feb. 7. Elmer K. Hiles, secretary, arranged the following program of speakers: Samuel Insull, president Commonwealth-Edison Company, Chicago, "Universal Electricity Supply"; Alba B. Johnson, president Baldwin Locomotive Works, Philadelphia, "Business Conditions After the War"; Wilbur D. Nesbit, Chicago, "Conversational Engineering." Walter Riddle, vice-president Sterling Varnish Company, Pittsburgh, officiated as toastmaster.

Last week's labor trouble at the Ohio works of the Carnegie Steel Company, Youngstown, Ohio, was not important. It involved 400 to 500 laborers, has been satisfactorily settled, and all the men are back at work.

The Sanitary Mfg. Company, Kenova, W. Va., is in the market for foundry equipment, wood-working machinery, hydraulic presses and dies, heavy duty pumps, gas engines, electric dynamo and motors, etc. J. H. Davis is general manager.

The temporary location of the Stupakoff Laboratories, pending the erection of its new quarters, is at 6364 Frankstown Avenue, Pittsburgh. Shipments should be made to East Liberty Station, Pennsylvania Railroad.

The Carnegie Steel Company has issued orders to have its blast furnace at Niles, Ohio, put in shape to be started as soon as possible. The metal will likely be used at the Ohio works of the company at Youngstown, Ohio. It has been idle some years and will turn out about 250 tons of pig iron per day.

A great scarcity of laborers is reported by manufacturing plants in the Shenango and Mahoning valleys. It is said as high as $2.50 per day is offered by some employers for 10 hr. work. The Jones & Laughlin Steel Company, which is erecting new pipe mills at Aliquippa, Pa., is having trouble in getting laborers for the foundation work for the buildings.

The Youngstown Sheet & Tube Company, Youngstown, Ohio, has given up for the present its intention of building a fifth blast furnace at East Youngstown. When bids for the erection of the new stack were opened, the prices quoted were found to be very high, and in addition the delivery of material would have been greatly delayed, and the furnace would have cost probably $200,000 more than was estimated by the company. The project may be taken up later in the year, but for the present nothing will be done.

The Colonial Steel Company, Pittsburgh, has bought about 60 acres adjacent to its steel plant at Colonial, Pa., which will probably be used for additions, the exact nature of which has not as yet been determined.

The Carbon Steel Company, Pittsburgh, gave a dinner in the Fort Pitt Hotel in that city on Monday evening, Feb. 7, to officials and heads of departments. Charles McKnight, president of the company, made an address on co-operation. C. E. Middleton, general superintendent, acted as toastmaster.

Cincinnati Sheet Metal Contractors

The Cincinnati Association of Sheet Metal Contractors, Cincinnati, Ohio, held a meeting at Schuler's restaurant on the evening of Feb. 1. President F. William Stechew called the attention of those present to the necessity of making preparations for the entertainment of the Ohio Master Sheet Metal Contractors' Association, whose annual convention will be held in Cincinnati some time in June. The finance committee appointed is headed by Charles Kebmann, who will be assisted by John Weigel, George Dietrick, E. L. Gibson, J. A. Sweeney, A. Blum and John A. Henggeler. Vice-president John Weigel was requested to confer with the officials of the State association, and after his report is received a special meeting will be called to make final arrangements for taking care of the coming convention.

The control of the Lima Locomotive Corporation, Lima, Ohio, has passed to Joel S. Coffin and Samuel G. Allen of New York from the White-Agerton-Carnes interests. Arthur W. Wheatby, vice-president Canadian Locomotive Company, will be president of the Lima Corporation; John E. Dockson, vice-president and general sales manager, and John E. Guess, secretary and treasurer. Watson Meyers is promoted to general manager of the plant.

REPUBLIC COMPANY'S REPORT

Rapid Improvement in 1915—Largest Net Earnings in Company's History

The sixteenth annual report of the Republic Iron & Steel Company, giving the results of its operations in the year ended Dec. 31, 1915, presents another illustration of rapid recovery from the depression of 1913-14. The profits, after provisions for depreciation of plants and exhaustion of minerals, were $4,385,723.12, against only $1,869,073.71 in 1914. The statement of income for the two years is as follows:

Comparative Statement of Income

	1915	1914
Net earnings from operations, after charges for maintenance and repairs	$5,439,598.41	$2,330,672.83
Interest and dividends received	183,310.55	76,879.45
Total profits	5,622,908.96	2,407,552.28
Less provisions as follows:		
Depreciation and renewal of plants	600,387.80	334,413.76
Extraordinary depreciation	400,000.00	.....
Exhaustion of minerals	236,798.04	204,064.81
Net profits	4,385,723.12	1,869,073.71
Deduct interest on bonds and notes	869,903.93	840,325.56
Net profits applicable to dividends	3,515,819.19	1,028,748.15
Add surplus end of previous year	6,615,289.54	6,512,777.64
Total surplus before dividends	10,131,108.73	7,541,525.79
Deduct:		
Dividends on preferred stock 4¾ per cent	1,187,500.00	.....
Two quarterly dividends of 1¾ per cent each	.....	875,000.00
Special appropriation from surplus	588,655.07	51,236.25
Net surplus Dec. 31	$8,354,953.66	$6,615,289.54

Comparative Statement Net Working Assets, Dec. 31

	1915	1914
Inventory	$7,644,296.11	$7,779,439.91
Ore contract payments	441,436.58	864,991.14
Accounts and bills receivable	4,890,614.88	2,783,919.08
Cash	3,760,237.47	797,291.38
Total current assets	16,736,585.04	12,225,641.51
Less current liabilities	3,225,795.17	1,473,280.18
Net working assets	$13,510,789.87	$10,752,361.33

Inventories

Inventories, Dec. 31

Inventory was taken on a basis of cost for the manufactured products and not to exceed market prices for products purchased, so that all depreciation in value has been absorbed and deducted from profit and loss.

	1915	1914
Finished product	$1,560,109.67	$1,292,480.00
Pig iron	592,706.79	774,865.38
Puddle mill products	39,418.22	12,785.14
Billets, blooms, slabs, etc.	438,141.66	428,768.88
Ores	2,868,495.96	3,375,592.27
Scrap	533,988.14	385,133.44
Ferromanganese	303,758.66	184,553.75
Fuel	191,693.14	178,303.95
Rolls, molds and stools	58,510.03	75,568.76
Stores	707,723.62	660,352.84
Commissary supplies	57,272.77	57,511.42
Miscellaneous	292,477.45	353,524.08
Total	$7,644,296.11	$7,779,439.91

Gross Volume of Business

Year ended Dec. 31, 1915	$29,916,228.74
Year ended Dec. 31, 1914	21,366,249.35
Year ended Dec. 31, 1913	31,937,059.20

Comparative Statement of Property Account

	1915	1914
New construction	$1,502,045.07	$1,070,608.68
Property additions	16,968.95	8,804.79
Property sold	.....	55,331.86
Property written off	30,000.00	.....
Unexpended balance of provision for depreciation and renewals for year	817,441.45	99,710.91

NEW CONSTRUCTION, IMPROVEMENTS AND PRODUCTION

In December, 1915, the construction of a new blast furnace of 550 tons daily capacity was authorized. It will be an addition to the company's Haselton group which is connected to the steel plants of the company by its own railroads, and will be known as Haselton furnace No. 5. No other important expenditures for new construction were authorized during the year at either the Northern or Southern furnaces, but all furnace plants have been kept in good physical condition by liberal expenditures for maintenance and repairs. The effect of these expenditures is shown by the fact that the furnaces made a new high record during the year despite the fact that owing to business conditions they were not operated to capacity the first half of the year. The theoretical annual blast-furnace capacity of the company, not including the new furnace under construction mentioned above, is as follows: Northern district, 900,000 gross tons; Southern district, 325,000 tons; total, 1,225,000 tons.

The company's pig-iron production in 1915 was 1,056,104 gross tons, against 777,811 tons in 1914 and 895,949 tons in 1913.

While no important expenditures were made at the Bessemer steel plant, the former high state of efficiency has been maintained by liberal expenditures for up-keep. Although the production for the year shows an increase over the preceding year, it was below the maximum, owing to business conditions the first half of the year. The company's production of Bessemer steel ingots in 1915 was 578,940 gross tons, against 391,826 tons in 1914 and 611,833 tons in 1913.

The open-hearth steel plant was enlarged in 1915 by the addition of two furnaces together with the necessary heating and other collateral equipment, which will result in an increase in the productive capacity of 20 per cent. Inasmuch as these additions were not completed until the latter part of December no material benefit was received in 1915. Under ordinary operating conditions the total theoretical annual capacity of the company's Bessemer and open-hearth works is now 1,300,000 gross tons of ingots.

The company's production of open-hearth steel ingots in 1915 was 464,208 gross tons, against 371,409 tons in 1914 and 347,488 tons in 1913. Its total production of Bessemer and open-hearth steel ingots in 1915 was 1,043,148 gross tons, against 763,235 tons in 1914 and 959,321 tons in 1913.

At the tube works, extensions have been completed to the threading and shipping floors and construction work is now well under way on one additional lap-weld and one additional butt-weld mill, which will increase the capacity of this plant 50 per cent. At the plate mill, the productive capacity has been increased by the addition of another heating furnace. At the Bessemer and Brown-Bonnell works the boiler plants are being concentrated and superheaters added; also, modern stokers with coal and ash-handling equipment are being provided. At this plant a crane runway is under construction for the billet yard and other minor improvements are being made. While the production shows a material increase over preceding years, it was not quite up to the maximum record on account of business conditions the first half of the year.

The company's production of finished and semi-finished products in 1915 was 1,033,394 net tons, against 760,054 tons in 1914 and 989,620 tons in 1913.

At the iron ore mines no work was done during the year in the way of exploration or development. At all ore mines, both North and South, the policy has been continued of providing safety appliances for the protection of employees against personal injury, and maintaining regular courses in instruction in first aid to the injured and mine rescue work. The production was not up to maximum capacity owing to business conditions the first half of the year.

The company's production of iron ore in 1915 was 1,440,376 gross tons, against 1,253,105 tons in 1914 and 1,743,504 tons in 1913.

There has been no material change in the coal reserves during the year. The grand total of reserves for the North and South as of Dec. 31, 1915, is 120,223,488 net tons, against 121,753,041 tons Dec. 31, 1914, and 123,108,949 tons Dec. 31, 1913.

The company's production of limestone and dolomite during the year shows a greater decrease than the pig-iron production indicates owing to the fact that its ore mines in the South were in better condition to provide a

larger percentage of self-fluxing ore than heretofore.

At the by-product coke plant, at Youngstown, Ohio, 75 additional ovens have been constructed during the year, together with a benzol recovery plant to produce finished benzol and its homologues. The capacity of the benzol plant is sufficient to take care of the gas from all the by-product ovens of the company. These improvements have been completed and are now in operation. At all coal mines, both North and South, every practical precaution against accidents is being taken and schools of instruction in first aid and rescue work are being maintained.

The company's coke production in 1915 was 740,053 net tons of bee-hive and 379,104 tons of by-product, making a total of 1,119,157 tons, against 641,095 tons of bee-hive and 209,816 tons of by-product, or a total of 850,911 tons in 1914.

The total number of men employed in all operations, North and South, averaged 11,105 in 1915, against 9906 in 1914 and 12,633 in 1913.

The balance sheet as of Dec. 31, 1915, is as follows:

Assets

Cost of properties Dec. 31, 1914	$69,244,671.04
Net additions for 1915	1,489,014.02
	70,733,685.06
Investment in Potter Ore Company	401,000.00
In other companies	530,051.47
Total capital assets	71,664,736.53
Cash with trustee for redemption of 10-30 year bonds, in addition to bonds of a par value of $2,036,000 retired	26,928.00
Inventory of manufactured products, material and supplies	7,644,296.11
Ore contract payments represented by ore at docks	441,436.58
Accounts and bills receivable, after reserve for doubtful accounts	4,890,614.88
Cash	3,760,237.47
Expenditure for stripping at mines, advanced royalties, etc., chargeable to future operations	735,517.71
Total assets	$89,163,767.28

Liabilities

Common stock issued	$27,191,000.00
Preferred stock issued	25,000,000.00
Total stock	52,191,000.00
Total 10-30 year bonds outstanding	17,833,000.00
Potter Ore Company bonds outstanding	271,000.00
Martin & Palos coke works bonds outstanding	227,500.00
Accounts payable	1,926,078.51
Ore contract balances representing cash received in excess of value of ore shipped customers	100,945.85
Taxes accrued	285,400.06
Interest accrued	223,125.00
*Provision for dividend payable Jan. 1, 1916	687,500.00
Unclaimed dividends	2,745.75
Reserves:	
Exhaustion of minerals and mining equipment	2,077,413.44
Depreciation and renewal of plants	3,905,462.76
Relining and rebuilding furnaces	408,995.72
Fire and accident insurance	244,187.20
Contingencies	424,459.33
Surplus Dec. 31, 1915	8,354,953.66
Total liabilities	$89,163,767.28

*Cumulative dividends at Dec. 31, 1915, 13¾ per cent; balance at Jan. 1, 1916, after payment of 2¾ per cent dividends due that date, 11 per cent.

UNPRECEDENTED MARKET CONDITIONS

The unfilled orders on hand Dec. 31, 1915, show large gains as compared with preceding similar periods, the increase being due to the unprecedented market conditions now prevalent. The report says: "There is no immediate sign of any recession in sight; in fact, current bookings are now at the maximum, while prices are well above the record of the past decade. The outlook, therefore, is suggestive of continued prosperity." On Dec. 31, 1915, unfilled orders for finished and semi-finished products were 591,270 tons, against 199,058 tons at the close of 1914 and 120,959 tons, 1913. Unfilled orders for pig iron on Dec. 31, 1915, were 138,406 tons, against 99,624 tons at the close of 1914 and 49,296 tons, 1913.

From remarks accompanying the presentation of the financial statement and general report the following extracts are taken:

"The improvement in the iron and steel business referred to in the last semi-annual report under date of June 30, 1915, was more rapid than expected, owing to the extraordinary demands made on this country by Europe for munition and other purposes, these demands being far in excess of trade expectations. Domestic business for up-keep and general purposes also ran beyond estimates, although demand for new construction was disappointing. On the whole, demand from all sources during the last half of the year was and is now in excess of production, which condition has resulted in raising prices to a level substantially in excess of price levels attained during the boom year 1907. While our production and shipments for the year ended Dec. 31, 1915, reached new records in volume, the values of products shipped averaged considerably less than during previous boom periods, due to the low prices prevailing the first six months. While prices advanced very gradually in the early part of the year, rapid advances were made in the last half, and therefore, earnings for the last half of the year were largely in excess of the totals for the first half. Increased capacity and improved processes, as well as increased efficiency, contributed no small part to the gains in profits realized. . . . Collateral notes heretofore reported outstanding have been retired through sales of bonds and ample funds are in hand to carry to completion all authorized improvements without further financing."

A Reconstruction Exposition in Paris

Plans are under way to hold an exposition in May, June and July of this year in the Garden of the Tuileries on the banks of the Seine in Paris, France, to show materials and processes of construction available for the reconstruction of habitations and cities destroyed in the war. According to the original prospectus the allied nations and Switzerland were to be invited, but it is understood that through Henry C. Long, of Boston, manufacturers of America will be admitted to the exposition. Mr. Long has been made director of the American section.

The exposition seems to be fathered by the Association Générale des Hygienistes et Techniciens Municipaux de France et des Pays de Langue Française. The classification of the exposition, besides covering plans for the reconstruction of destroyed towns and areas, embraces divisions devoted to highways and roads; the aesthetic side of town planning; public health matters, such as sewage disposal, water supply and the like, and public buildings and dwellings, including the lighting, heating and other equipment. One general group will be devoted to materials and processes of construction.

American exhibitors are to be charged 8 francs per square meter (41 cents per square foot) of space occupied, and 1 per cent of the sales contracts made in the period of the exposition. Space for outdoor exhibits will be available at a less price. American exhibitors are referred to Henry C. Long, 5 Opera Square, Paris. Edouard Tijou is Administrateur-general of the exposition, at 16 Rue Taitbout, Paris.

The Aluminum Castings Company's plant at Manitowoc, Wis., was obliged to close for several days last week because of the lack of raw material. This is the first known instance in the Northwest that the shortage of aluminum has proved serious. The Manitowoc foundry, like others operated by the company, has been working to capacity for many months, mostly on orders from the automobile industry. Supplies are now being received, but the situation is viewed with apprehension.

The *Welding Engineer* is the name of a new monthly publication brought out by the Welding Engineer Publishing Company, 220 South State Street, Chicago, Ill. L. B. Mackenzie is president and editor. The first number contains an article on the use of the welding process for reclaiming small pieces of high-speed steel by welding them to ordinary carbon steel in making metal cutting tools.

The Susquehanna Iron Company, Columbia, Pa., has resumed operations in its wrought-iron pipe mills, which have been idle for some time. Sufficient orders have been booked to keep the plant in continuous operation until late in the spring.

PERSONAL

Chairman E. H. Gary of the United States Steel Corporation is one of the nine representatives from the United States who, with a like number from each of the Latin-American republics, will participate in the International High Commission at Buenos Ayres, Argentina, which begins its sessions April 3. The commission will recommend uniform regulations in the various countries respecting banking and the details of business practice.

T. H. Gillespie, treasurer, Standard Steel Car Company, Pittsburgh, has been elected a director of the Lyndora National Bank, Butler, Pa.

A. N. Diehl, assistant general superintendent, Duquesne steel works and blast furnaces of the Carnegie Steel Company at Duquesne, Pa., has been elected chairman of the metallurgical and mining section of the Engineers' Society of Western Pennsylvania.

Frank P. Powell, formerly superintendent of the Empire sheet mills of the Brier Hill Steel Company, at Niles, Ohio, has been placed in charge of the new jobbing mills to be erected adjacent to the open-hearth steel plant of that company at Youngstown, Ohio.

Edmund F. Saxton, recently assistant director of the Department of Wharves, Docks and Ferries of Philadelphia, and formerly chief engineer of the United Railways of Yucatan, and for 15 years in charge of testing laboratories, railroad location and betterment, reinforced concrete and bridge construction, etc., has opened offices to conduct a general consulting engineering practice at the Pennsylvania Building, Philadelphia.

Allen Breed, special sales engineer for the Lodge & Shipley Machine Tool Company, Cincinnati, Ohio, has returned after a year's sojourn in England and France on business.

Donald Kirkpatrick has been re-elected secretary of the Builders' Exchange, Springfield, Ohio.

John Williams, assistant general foreman of blast furnaces at South works, Illinois Steel Company, has been appointed general foreman of blast furnaces at the Duluth works of the Minnesota Steel Company.

Paul Makall, who has been Chicago sales agent of the Bethlehem Steel Company, has been appointed Western sales representative in charge of all territory from Pittsburgh west, including that city. J. M. Price has been appointed to succeed him in charge of the Chicago office.

Frank P. Donneworth has been elected general manager of the Carroll Foundry & Machine Company, Bucyrus, Ohio, in addition to his duties as vice-president. As manager he fills the vacancy created by the recent death of P. J. Carroll.

Russell Huff, who was elected president of the Society of Automobile Engineers at the annual meeting in New York in January, is chief engineer of Dodge Brothers, Detroit.

George W. Scott has become connected with the H. H. Franklin Mfg. Company, Syracuse, N. Y., as plant engineer. He was identified with the Faultless Rubber Company, Ashland, Ohio, in charge of the mechanical department.

W. R. Cunnick, formerly connected with the sales department of the Trumbull Steel Company at Warren, Ohio, has been transferred to the Eastern district office of the company in the Grand Central Terminal Building, New York.

William H. Mills, president of Naylor & Co., Inc., New York, who has been in England for some weeks, sails from London on his return trip on Saturday.

Thomas F. Williams, formerly chief mechanical engineer of the Aeromarine Plane & Motor Company, Avondale, N. J., and a specialist in carburization of fuels, has accepted the position of chief consultant of the board of engineering research, mechanical applications, of the Powdered Coal Engineering & Equipment Company, McCormick Building, Chicago, and will direct the research work of that company in the carburization of comminuted fuel and the application of automatic mechanical regulation and controls thereof.

Col. H. B. Bope, first vice-president and general sales manager, Carnegie Steel Company, addresses the Cleveland Association of Credit Men at luncheon at the Statler Hotel, Cleveland, Ohio, this Thursday, Feb. 10, on "The Human Equation in Preparedness."

DeWitt V. Moore, Lytton Building, Chicago, has resigned from the position of district engineer, Central district, Division of Valuation, Interstate Commerce Commission, with headquarters at Chicago, to specialize in railroad valuation work in a consulting capacity. Particular attention will be given to cost analysis.

S. J. O'Niel, formerly with O'Brien Brothers, Chicago, joined the selling staff of the Moller & Schumann Company, Hilo varnishes and enamels, Brooklyn, N. Y., Feb. 1. He will travel from the Chicago branch of the company.

W. P. Snyder, president Shenango Furnace Company, Pittsburgh, has gone to Palm Beach, Fla., for the winter.

J. F. Brittingham, for four years Pittsburgh representative of the Crocker-Wheeler Company, Ampere, N. J., has resigned to become Pittsburgh district sales manager of the Cleveland Crane & Engineering Company, Wickliffe, Ohio, with offices in the First National Bank Building, Pittsburgh.

J. G. Miller has resigned as general sales manager of the Adrian Furnace Company, Dubois, Pa., and the Punxsutawney Iron Company, Punxsutawney, Pa., the change becoming effective March 1. It is understood that while he may continue to sell the irons of these companies he will devote more time to his other interests.

Lehigh Valley Wage Advances

The Thomas Iron Company and the Empire Steel & Iron Company have announced an advance of 10 per cent in wages, effective Feb. 1, at their iron mines in New Jersey—the Richard mine of the former and the Mt. Hope and Oxford mines of the latter. Through the locals of the Western Federation of Miners a demand for a 15 per cent increase in wages and an eight-hour work day had been made. The eight-hour day was not conceded. For mechanics and laborers employed on the surface the new rate is $2 for a nine-hour day. All shift men on the surface will work in three eight-hour shifts. A sliding scale wage is being worked out. Drill runners will get $2.65 for eight hours and muckers and scrammers will get $2.35 for eight hours underground. The two companies named have also advanced wages at their blast furnaces 10 per cent, effective Feb. 16.

New President of the Dominion Steel Corporation

Mark Workman has been elected president of the Dominion Steel Corporation, Sydney, Cape Breton, succeeding J. H. Plummer, who after serving as president for a number of years becomes chairman of the board. His retirement was caused by the effects of a protracted illness. It is reported that he will soon go to the front in France where his son and son-in-law are officers in the Canadian forces. The Montreal press states that the company will soon engage a steel expert to supervise the operations of the plants and to advise as to its general policy. Hector McInnes, chief counsel of the company, has been made a director.

The George B. Lessig Company, Pottstown, Pa., announced Feb. 5 that within a few weeks it will start its puddling mills, idle for more than a year. The plant contains 22 double puddling furnaces, 2 regenerative furnaces, one 9-in. and four 22-in. trains of rolls and 105 cut nail machines. Its principal products have been muck bar, shovel, tack and nail plate and cut nails.

Judicial Decisions

ABSTRACTED BY A. L. H. STREET

INJURY TO MACHINE-SHOP EMPLOYEE.—A machinist employed by a manufacturing company was directed to do electric wiring in the company's foundry. While he was standing on a ladder, vibrations produced by a traveling crane used in moving molten metal threatened his fall, and to save himself he threw his hand upon the crane track, sustaining injuries in consequence. Held, that since the foundry and the machine shop were separate departments under the supervision of different foremen, and the machinist was subject to the control of the machine-shop foreman, and not of the foundry foreman, negligence of the latter must be regarded as that of a mere fellow servant for which the company is not liable. (Texas Court of Civil Appeals, Murray vs. Houston Carwheel & Machine Company, 181 Southwestern Reporter, 241.)

INJURY TO PERSONS VOLUNTEERING SERVICES.—A claim that an iron works company sent a load of iron by one of its drivers to be delivered, knowing that it would require assistance from others to unload it, that the driver called upon plaintiff to assist, and in so doing the plaintiff was injured by a piece of iron falling on his hand, is insufficient to establish liability on the part of the company. (Kansas Supreme Court, Hockenberry vs. Capital Iron Works, 152 Pacific Reporter, 628.)

ASSUMPTION OF RISK IN CASE OF SIMPLE TOOLS.—An employee in a machine shop assumed the risk of being injured through the slipping of a defective wrench while he was screwing on a nut, any worn or loose condition of the jaws being plainly apparent to him, and this is especially so when it appears that he contributed to the accident by attempting to do the work in an improper position. (Kansas City Court of Appeals, Neil vs. Pryor, 180 Southwestern Reporter, 407.)

APPLICABILITY OF COMPENSATION ACT.—An employee in an iron company's plant was killed through falling into a hole concealed by escaping steam, while hurrying to aid a fellow workman who had fallen into the same place. Held, that he was killed in the "course of his employment" in the sense that his dependent relatives are entitled to an award under the Illinois Workmen's Compensation Act. (Illinois Supreme Court, Dragovich vs. Iroquois Iron Company, 109 Northeastern Reporter, 999.)

INJURY TO WORKMEN IN UNLOADING BEAMS.—It is not the legal duty of an employer to use derricks in unloading steel beams weighing from 800 to 4000 lb., to avoid injury to men engaged in such work. Nor can direction of the foreman of an unloading gang to "shove" a beam from a wagon be regarded as negligence rendering the employer liable to one of the men for injury received by his being struck by one end of the beam, the foreman being entitled to assume that the men would unload the beam in a proper manner and be on their guard to avoid injury to themselves. (New York Supreme Court, Appellate Division, Nielsen vs. George A. Just Company, 155 New York Supplement, 442.)

CONTRIBUTORY NEGLIGENCE RESPECTING SET SCREWS.—An experienced employee engaged in installing machinery for his employer and injured through carelessly permitting his clothing to catch upon a revolving set screw of which he knew cannot excuse his failure to exercise due care for his own safety by claiming that his mind was concentrated on measurements he was making above the shaft. (New York Supreme Court, Appellate Division, Conway vs. Naylor, 156 New York Supplement, 340.)

NEGLIGENCE OF EMPLOYER IN STEEL TANK CONSTRUCTION.—Where an employee engaged in assisting in construction of a steel tank fell from a narrow footing while handling a plate, the employer was liable if the accident resulted from negligent assignment of two inexperienced men to work which reasonably required three, including one of experience; or from negligent failure to provide a reasonably safe place for doing the particular work; or from failure to warn plaintiff against a danger which his inexperience did not enable him to appreciate. The award of $15,000 was not excessive recovery in this case, it appearing that plaintiff was so badly injured that he will never be able to do manual work again, and is unable to feed or dress himself without difficulty. (Louisiana Supreme Court, Iddle vs. Hamler Boiler & Tank Company, 70 Southern Reporter, 50.)

LIABILITY OF TRANSFER COMPANIES.—A transfer company engaged by a manufacturer to move a heavy machine is liable for injury to an employee resulting from use of defective moving appliances furnished by the transfer company. (Nebraska Supreme Court, Wiseblood vs. Omaha Merchants' Express & Transfer Company, 154 Northwestern Reporter, 539.)

INJURY CAUSED BY DEFECTIVE TOOLS.—A manufacturer is liable for injury to a machinist caused by a splinter from a defective punch flying into his eye while he was trying to loosen a drill with the punch, unless he was guilty of contributory negligence in knowingly using the defective tool. (Iowa Supreme Court, Flick vs. Globe Mfg. Company, 154 Northwestern Reporter, 928.)

TAX EXEMPTION OF MANUFACTURING CORPORATIONS.—The Pennsylvania statute which exempts from taxation so much of the capital stock of a corporation as is exclusively employed in domestic manufacturing operations does not extend to a corporation whose business consists in buying raw materials and paying another company to convert them into manufactured products. (Pennsylvania Supreme Court, Commonwealth vs. Williamsport Rail Company, 95 Atlantic Reporter, 795.)

GOOD WILL OF BUSINESS AS TAXABLE ASSET.—In computing the value of the assets of a business owned by a decedent for the purpose of assessing an inheritance tax under the New York laws the value of the good will of the business should be considered. (New York County Surrogate's Court, in re Gumbinner's Estate, 155 New York Supplement, 188.)

RIGHTS UNDER PURCHASE OF GOOD WILL.—An agreement made by a manufacturer of post-hole augers and diggers and other articles on selling all of the property used in making the augers and diggers not to compete with the purchaser is enforceable, although not limited as to time or territory, and is not invalid as being unlawfully in restraint of trade, it appearing that the seller's business had been extended to most of the States of this country and to parts of Canada, and that the price paid by the purchaser exceeded the value of the physical property so sold. But even when there is no express agreement not to compete with a successor, competition will be restrained where it appears that the seller is trying to retake good will which he has sold to the complaining party. (United States Circuit Court of Appeals, Seventh Circuit, Hall Mfg. Company vs. Western Steel & Iron Works, 227 Federal Reporter, 588.)

CANCELLATION OF ORDERS BY MUTUAL CONSENT.—A letter from a contract purchaser of goods expressing regret on being compelled to request cancellation of the order, and a reply of the seller, "We are also grieved that it is necessary to cancel the order," are sufficient to show rescission of the contract by mutual consent. (Utah Supreme Court, Schwab Safe & Lock Company vs. Snow, 152 Pacific Reporter, 171.)

TERMINATION OF EMPLOYMENT CONTRACTS.—When a contract of employment specifies no duration and provides for payment of wages or salary by the week, month or other period, it may be terminated by either party at the end of any payment period. (Alabama Supreme Court, National Life Insurance Company vs. Ferguson, 69 Southern Reporter, 823.)

POWERS OF CORPORATIONS.—Although a manufacturing corporation is without power to engage in a general insurance business, it may maintain a scheme of insurance for the benefit of its employees. (Alabama Supreme Court, Bailey vs. United States Cast Iron Pipe & Foundry Company, 69 Southern Reporter, 825.)

Iron and Steel Markets

SOLD UP FOR THE YEAR

The Condition of More Steel Mills

A Situation Without Parallel—Further Price Advances in Heavy Products

The heavy business in finished steel put on the books of the leading steel companies in the past two weeks has resulted in a situation unparalleled in the history of the trade. It now appears that the largest producers are sold up for 1916 on heavier products, particularly shapes and plates, and that some have little left for the fourth quarter in lighter products.

Considerable sales of plates and shapes have been made for the first quarter of 1917, more especially to shipyards, and on plates 2.10c., and in some cases 2.25c., Pittsburgh, has been paid on these contracts.

The fact made known two weeks ago that leading Chicago producers had allotted the remainder of their expected output for the second half among their customers led to prompt negotiations with mills at Pittsburgh and elsewhere by manufacturing consumers of finished steel, and the result has been a large volume of buying at stipulated prices besides considerable contracting for last half delivery on the basis of what may be the market at that time.

Shell steel was a factor in this late buying—how large is not yet clear. French requirements in large rounds were covered to an extent estimated as high as 250,000 tons. One of these contracts, it is reported, was for upwards of 100,000 tons, on which the price was 2.80c. at mill. There have been some good-sized barb wire contracts also for third and fourth quarters.

The anxiety of consumers in all lines to buy for third and fourth quarters has been more apparent, and some manufacturers who buy rolled steel have been selling their product for the second half, conditioned on their ability to get steel and with the stipulation that prices will be determined by the prices they pay for steel.

As the situation is developing, steel companies are having to choose between booking highly profitable war business and taking care of domestic customers on a considerably lower basis. Instances are coming out in which the choices already made by some mills have caused no small complaint from home buyers. The fact is that few mills can forecast accurately deliveries on what they have booked, and this is one reason for refusing future business.

An advance of $2 a ton on contract bars, shapes and plates was made in the week, or to 2c., Pittsburgh, for bars and shapes and 2.10c., Pittsburgh, for plates. However, on plates for delivery in three or four months mills are obtaining 2.50c. to 2.60c., Pittsburgh, while 2.75c. and 3c. are common prices on prompt plates.

Railroad needs are coming out, in the rush of buyers in other lines to cover for the last half of the year. In the past week Steel Corporation mills have sold 25,000 tons of rails, the largest single order being 7500 tons for the Minneapolis & St. Louis. About 25,000 cars are pending, the Northwestern having just inquired for 5000 to 6000, in addition to 90 locomotives. Locomotive buying is large, 120 having been closed in the past week, while there are inquiries for 275. Much of the present transportation breakdown is due to shortage of motive power.

The leading producer of sheets is asking $2 more for open-hearth than for Bessemer products, but the amount of Bessemer capacity available will not mean any great relief from that quarter. In both sheets and tin plates the mills are getting more completely sold up, and on the latter $4 a box is already obtained for export.

The sluggishness of the pig-iron market is more commented upon, and in some districts the tone is less firm. There has been more offering of Southern resale iron at $14.50, and Tennessee iron is sold on a $14.50, Birmingham, basis for early delivery.

On the other hand are signs that important buyers may soon take hold. In eastern Pennsylvania one steel interest bought 77,500 tons of basic for the last five months of the year at $19.50, delivered, whereas furnaces have lately been holding for $20. In the Chicago district buying for the last half has increased, and a malleable interest has come into the market for a round tonnage.

The possible effect of new open-hearth capacity coming forward and available for second and third quarters is taken into account by pig-iron producers. Apropos of this phase is the proposal to ship Alabama pig iron to a Northern steel plant of the Steel Corporation.

The scarcity in prompt ferromanganese is more acute. As high as $250 has been paid in small sales. Large steelmakers are not uneasy, but with smaller buyers the stringency is likely to increase. Contract spiegeleisen could be had recently at $35, but in the past week sales amounting to several thousand tons have been made at $40.

Pittsburgh

PITTSBURGH, PA., Feb. 8, 1916.

Price advances during the week include $2 per ton on shapes and steel bars for far future delivery, $3 on hoops and a readjustment in iron boiler tubes. The demand on the steel mills for deliveries by customers is as insistent as ever. Instead of catching up on orders, the mills are getting steadily further back. On plates and shapes, the Carnegie and Jones & Laughlin companies are practically sold up for the remainder of this year. This is also largely true of steel bars, both companies having about all the business on their books they can turn out this year. In tin plate and sheets the mills have actual specifications for five to six months ahead, and one leading maker is now quoting $4 per box for shipment from stock. Prices on ferromanganese for prompt shipment have gone skyward in the past week, sales of several cars being reported at $250 per ton for spot shipment. The local pig-iron market is quiet, and prices on Bessemer, basic and foundry iron are easier. There is not much new inquiry for billets and sheet bars, but prices are steady.

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics

At date, one week, one month, and one year previous

Pig Iron, Per Gross Ton:	Feb. 9, 1916.	Feb. 2, 1916.	Jan. 5, 1916.	Feb. 10, 1915.
No. 2 X, Philadelphia...	$20.00	$20.00	$19.75	$14.25
No. 2, Valley furnace....	*18.25*	18.50	18.50	13.00
No. 2 Southern, Cin'ti...	17.90	17.90	17.90	12.40
No. 2, Birmingham, Ala.	15.00	15.00	15.00	9.50
No. 2, furnace, Chicago*	18.50	18.50	18.50	13.00
Basic, del'd, eastern Pa.	19.50	19.50	19.50	13.50
Basic, Valley furnace...	*17.50*	17.75	18.00	12.50
Bessemer, Pittsburgh ...	21.45	21.45	21.95	14.55
Malleable Bess, Ch'go*	19.00	19.00	19.00	13.00
Gray forge, Pittsburgh..	18.45	18.45	18.45	13.45
L. S. charcoal, Chicago..	19.45	19.45	19.25	15.75
Billets, etc., Per Gross Ton:				
Bess. billets, Pittsburgh.	33.00	33.00	32.00	19.50
O.-h. billets, Pittsburgh.	**35.00**	34.00	33.00	19.50
O.-h. sheet bars, P'gh....	35.00	35.00	35.00	20.50
Forging billets, base, P'gh	55.00	55.00	55.00	24.00
O.-h. billets, Phila.....	42.00	42.00	40.00	21.40
Wire rods, Pittsburgh...	**47.00**	45.00	40.00	25.00
Finished Iron and Steel, Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Bess. rails, heavy, at mill	1.25	1.25	1.25	1.25
Iron bars, Philadelphia..	2.409	2.409	2.159	1.20
Iron bars, Pittsburgh....	2.15	2.15	1.95	1.10
Iron bars, Chicago.....	1.90	1.90	1.75	1.02½
Steel bars, Pittsburgh...	2.25	2.25	2.00	1.10
Steel bars, New York....	2.419	2.419	2.169	1.26
Tank plates, Pittsburgh.	2.50	2.50	2.25	1.10
Tank plates, New York..	2.669	2.669	2.419	1.26
Beams, etc., Pittsburgh..	2.00	2.00	1.90	1.10
Beams, etc., New York..	**2.169**	2.119	2.069	1.26
Skelp, grooved steel, P'gh	1.90	1.90	1.80	1.10
Skelp, sheared steel, P'gh	2.00	2.00	1.90	1.15
Steel hoops, Pittsburgh..	**2.25**	2.10	2.00	1.20

*The average switching charge for delivery to foundries in the Chicago district is 50c. per ton.

Sheets, Nails and Wire, Per Lb. to Large Buyers:	Feb. 9, 1916.	Feb. 2, 1916.	Jan. 5, 1916.	Feb. 10, 1915.
	Cents.	Cents.	Cents.	Cents.
Sheets, black, No. 28, P'gh	2.60	2.60	2.60	1.80
Galv. sheets, No. 28, P'gh	4.75	4.75	4.75	3.00
Wire nails, Pittsburgh..	2.20	2.20	2.10	1.55
Cut nails, Pittsburgh....	2.10	2.10	2.00	1.50
Fence wire, base, P'gh..	2.05	2.05	1.95	1.35
Barb wire, galv., P'gh..	3.05	3.05	2.95	1.95
Old Material, Per Gross Ton:				
Iron rails, Chicago.....	*17.25*	17.50	17.50	11.50
Iron rails, Philadelphia..	19.50	19.50	19.50	13.00
Carwheels, Chicago.....	*15.75*	14.25	14.75	10.00
Carwheels, Philadelphia.	16.50	16.50	16.00	10.50
Heavy steel scrap, P'gh.	*17.00*	17.25	17.50	11.50
Heavy steel scrap, Phila.	16.50	16.50	16.00	10.00
Heavy steel scrap, Ch'go	14.75	14.75	16.00	9.50
No. 1 cast, Pittsburgh...	15.75	15.75	15.25	11.25
No 1 cast, Philadelphia.	17.00	17.00	17.00	12.00
No. 1 cast, Ch'go (net ton)	*12.75*	13.00	13.75	9.00
Coke, Connellsville, Per Net Ton at Oven:				
Furnace coke, prompt...	**$3.50**	$2.75	$3.25	$1.50
Furnace coke, future...	2.50	2.50	2.50	1.65
Foundry coke, prompt...	3.50	3.50	3.50	2.00
Foundry coke, future....	3.25	3.25	3.25	2.15
Metals, Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Lake copper, New York.	**26.50**	25.50	22.87½	15.25
Electrolytic copper, N. Y.	**26.37½**	25.37½	22.87½	14.75
Spelter, St. Louis.....	**19.00**	18.25	17.25	8.00
Spelter, New York.....	**19.25**	18.50	17.50	8.25
Lead, St. Louis.....	6.00	6.00	5.40	3.67½
Lead, New York.....	6.10	6.10	5.50	3.80
Tin, New York.....	*41.12½*	41.62½	45.00	36.00
Antimony, Asiatic, N. Y..	**43.50**	42.50	41.00	18.50
Tin plate, 100-lb. box, Pgh.	**$4.00**	$3.75	$3.75	$3.10

Scrap is quiet, with prices showing an easier tone, but prompt furnace coke is higher due to a shortage in cars. Higher prices on finished material seem likely. The mills are doing the best they can on deliveries, distributing their output as much as possible, but they are unable to give consumers more than 50 per cent of the material they want, and in many cases they get less.

Pig Iron.—W. P. Snyder & Co. report the average price on Bessemer iron in January to have been $20.645 and on basic $17.833, both at Valley furnace. In Bessemer iron, this is an advance of $1.624 over December, and in basic a little more than 34c. Actual sales of Bessemer and basic pig iron in January, as reported by them, were much less than in any previous month for some time. New inquiry for pig iron is still quiet. The Colonial Steel Company bought last week 2000 tons of Bessemer iron for second and third quarter delivery at $20.50, Valley furnace. Sellers are quoting $17.75 on basic iron and $18.50 on No. 2 foundry at Valley furnace, but if any business was offering, these prices could be shaded 25c. It is claimed that 6000 tons of Bessemer iron was sold recently for export to Italy at $21, Valley furnace, but the iron has not been shipped out on account of the railroad embargo. We quote standard Bessemer iron at $20.50; basic, $17.50 to $17.75; malleable Bessemer, $17.50; gray forge, $17.50, and No. 2 foundry, $18.25 to $18.50, all at Valley furnace, the freight rate for delivery in the Cleveland and Pittsburgh districts being 95c. per ton.

Billets and Sheet Bars.—There is no new inquiry for semi-finished steel, but consumers are specifying freely against contracts and steel mills are still far back in deliveries. Premiums of $2 to $3 per ton for both billets and sheet bars are paid, for prompt delivery, over prices which consumers are paying that have sliding scale contracts. A sale of 1000 tons of open-hearth billets for prompt shipment is reported at about $36 per ton at Youngstown mill. We quote Bessemer billets and sheet bars at $33 and open-hearth billets and sheet bars at $34 to $35, maker's mill, Pittsburgh or Youngstown district. We quote forging billets at $55 to $56, for sizes up to but not including 10 x 10 in., and for carbons up to 0.25, the regular extras being charged for larger sizes and higher carbons. Forging billets running above 0.25 and up to 0.60 carbon take $1 per ton extra.

Ferroalloys.—There is an acute shortage in the supply of ferromanganese for prompt shipment, and sales of several cars are reported at $225 and as high as $250 for prompt shipment 80 per cent English ferromanganese. The Dunbar furnace, which made ferromanganese for a long time, has been running on spiegel lately, and this has added to the shortage in the supply of prompt ferromanganese. There is much uneasiness among consumers whose stocks are running low, and who fear these may be entirely depleted before they are able to get another supply. One consumer has offered $210 for ferromanganese for prompt shipment, for up to 100 tons, but has not been able to get it. English makers are still quoting 80 per cent at $125, seaboard, but give no guarantees as to deliveries, and which might not be made before the latter part of this year. We quote prompt 80 per cent ferromanganese at $225 to $250 per ton, and 20 per cent spiegeleisen at $40 per ton. We quote 50 per cent ferrosilicon for delivery through all of 1916 as follows: Up to 100 tons, $85; over 100 tons and up to 600 tons, $84, and over 600 tons, $83; all per gross ton, delivered in the Pittsburgh district.

Plates.—The Pennsylvania Railroad is sounding local mills as to what deliveries they can make on 22,000 tons of plates, shapes and bars for the 2000 cars which it will build at its Altoona shops. Two leading local mills state the best they can do in the matter of deliveries would be to ship some of these plates in July, and several other mills refuse to put a price on the inquiry. The Carnegie and Jones & Laughlin companies are practically sold up on all the plates they can make for the remainder of this year, and on some specific shipyard work sales have been made for first quarter of 1917 delivery at 2.10c., Pittsburgh. The Standard Steel Car Company has taken 1000 steel tank cars for the Union Tank Line, and the Pressed Steel Car Company 100 steel gondolas for the Bethlehem Steel Company and ten ore cars for the Diamond Alkali Company. It is said that the Erie Railroad will defer its intended purchase of 2000 cars because of the high prices it has been quoted. The price of plates is 2.50c. to 2.60c. for delivery in three to four months, maker's mill. We note a sale of 300 tons of sheared plates at 2.50c. at mill for July delivery, and the buyer states this was the lowest price and the best delivery he could obtain.

Structural Material.—New inquiry continues abnormally heavy. Local fabricators are filled up for some months and are not actively bidding on new work coming up. The Mount Vernon Bridge Company, Mount Vernon, Ohio, has taken 2500 tons for steel buildings for the new open-hearth plant of the Ashland Iron & Mining Company, Ashland, Ky.; the American Bridge Company, 800 tons for a coaling station for the Detroit Edison Company, Detroit, Mich., and the Riter-Conley Mfg. Company 300 tons for an extension to the foundry of the Mesta Machine Company, West Homestead, Pa. It is said that active inquiries are in the market from railroads for about 40,000 tons of steel shapes for bridge work. The minimum price on beams and channels up to 15 in. is 2c. for deferred deliveries, and from 2.25c. to 2.50c. mill for reasonably prompt shipments.

Steel Rails.—Only small orders for standard sections are being placed, but the new demand for light rails is active, especially from coal-mining companies, who are very busy. The Carnegie Steel Company received new orders and specifications in the past week for over 5000 tons of light rails. We quote light rails as follows: 25 to 45 lb. sections, 1.70c.; 16 and 20 lb., 1.75c.; 12 and 14 lb., 1.80c.; 8 and 10 lb., 1.85c., in carload lots. An advance of 5c. per 100 lb. is charged for less than carloads and down to three tons, while under three tons an additional 5c. is charged. We quote standard section rails of Bessemer stock at 1.25c. and of open-hearth steel, 1.34c., Pittsburgh.

Sheets.—The American Sheet & Tin Plate Company is now charging $2 per ton advance on sheets made from open-hearth stock over Bessemer. Shipments of hot tin and sheet mill products by this company are now the heaviest in its history. The new demand for blue annealed, Bessemer, electrical and galvanized sheets is very heavy, and specifications are being received by the mills at an enormous rate. The sheet mills are sold up to July, and some have entered orders for third quarter delivery. For delivery in second quarter we quote: Nos. 9 and 10 blue annealed sheets, 2.65c. to 2.75c.; No. 28 Bessemer black, 2.60c.; open-hearth, 2.70c.; No 28. galvanized sheets from Bessemer stock, 4.75c., and from open-hearth, 4.85c., at maker's mill. We quote Nos. 22 and 24 black plate, tin mill sizes, H. R. and A. 2.40c.; Nos. 25, 26 and 27, 2.45c.; No. 28, 2.50c.; No. 29, 2.60c., and No. 30, 2.70c. These prices are for carloads and larger lots, f.o.b. maker's mill, but some makers are quoting higher figures.

Tin Plate.—Reports are that an inquiry is in the market for shipment to the Far East for 360 000 boxes of tin plate for delivery at the rate of 45,000 boxes per month, starting in April. This huge inquiry has been put up to several local mills, but they state they could not possibly make any deliveries on the order before July, so that if the order is placed in this country the intending buyer will have to revise the deliveries wanted. Specifications against contracts are very heavy, and the mills now have orders on their books for all they can turn out up to July or further. Prices are very strong, and in small lots for shipment from stock $4 is quoted, at which sales have been made. The export demand is very heavy, and all indications are that the price of tin plate will be $4 per box before very long. The mills are running to practically 100 per cent capacity.

Railroad Spikes.—The new demand from the railroads is quiet, and specifications against contracts are only fair. There is some cutting in prices of spikes by jobbers who have fairly large stocks laid in some time ago at lower prices than makers are now quoting, but this is confined entirely to jobbers. We quote:

Standard railroad spikes, 4½ x 9/16 in. and larger, $2.25; railroad spikes, ½ and 7/16 in., $2.35 base; railroad spikes, ⅜ in. and 5/16 in., $2.50 base; boat spikes, $2.35 base, all per 100 lb., f.o.b. Pittsburgh.

Skelp.—The new demand is very heavy and mills are sold up for four or five months. Prices are very firm and likely to be higher. We quote: Grooved steel skelp, 1.90c. to 1.95c.; sheared steel skelp, 2c. to 2.05c.; grooved iron skelp, 2.30c. to 2.35c., and sheared iron skelp, 2.40c. to 2.45c., all delivered to consumers' mills in the Pittsburgh district.

Wire Rods.—Local makers have no rods to sell in the open market and in fact are unable to give regular customers rods as fast as they want them. As high as $50 per ton is offered for Bessemer or open-hearth rods for shipment in two to three months from date of contract. A sale of 2000 tons of Bessemer rods was made recently by a local maker for export to Canada at $45 or higher, maker's mill. The nominal price of Bessemer, open-hearth and chain rods is $45 at mill to regular customers for second and third quarter delivery, but for shipment in six to eight weeks $50 per ton or better could easily be obtained.

Wire Products.—It looks very much like a famine in the supply of wire and wire nails, which are probably the two scarcest products on the whole finished steel list. Local makers have their output sold up for four or five months, and are not able to make deliveries to regular customers of more than 50 per cent of the amount of wire and nails called for in contracts. Practically no attention is paid here to export inquiries for either nails or wire as local makers could not take these orders and make the deliveries wanted. Prices quoted to the large trade, on which shipments probably could not be made inside of four or five months, are as follows: Wire nails, $2.20; galvanized, 1 in. and longer, taking an advance over this price of $2, and shorter than 1 in., $2.50; plain annealed wire, $2.05; galvanized barb wire and fence staples, $3.05; painted barb wire, $2.35; polished fence staples, $2.35; cement coated nails, $2 base, all f.o.b. Pittsburgh, with freight added to point of delivery, terms 60 days, net, less 2 per cent off for cash in 10 days. Discounts on woven wire fencing are three points lower and are now quoted at 64½ per cent off list for carload lots; 63½ per cent for 1000-rod lots and 62½ per cent for small lots, f.o.b. Pittsburgh.

Hoops and Bands.—Last week the Carnegie Steel Company advanced its prices on steel hoops to 2.25c. and on steel bands to 2.10c. for such deliveries as it may be able to make late in the year. These, or higher prices, are also being quoted by other makers. The new demand is heavy and specifications are coming in very freely. Local makers have their output sold up for five or six months.

Shafting.—The nominal discount on cold rolled shafting in carload lots is 45 per cent off and on small lots 40 per cent off, f.o.b. Pittsburgh, but local makers have their output sold for the next six or eight months. Specifications from implement makers, automobile builders and screw stock machine people are abnormally heavy, and makers are back in deliveries eight to ten weeks or longer. Premiums over regular prices are readily paid for deliveries in three to four weeks.

Iron and Steel Bars.—The minimum price on steel bars is 2c. at mill for deliveries late in the year, but for reasonably prompt shipment the price is 2.25c. and as high as 2.50c. for small lots from stock. The new demand for steel bars is the heaviest ever known, and the mills are congested with orders. Mills rolling iron bars also report the demand heavy and the high prices now ruling are firmly held. We quote steel bars at 2c. for delivery in third and fourth quarters, 2.25c. to 2.50c. for shipment between now and July, and 2.40c. to 2.50c. for delivery from warehouse. We quote refined iron bars at 2.15c. to 2.20c., and railroad test bars, 2.25c. to 2.30c., f.o.b. mill, Pittsburgh.

Nuts and Bolts.—Makers report the export and domestic demand abnormally heavy and much beyond capacity to supply. Deliveries are deferred eight to ten weeks or longer. Export shipments are again cut off because of the railroad embargo. Discounts now in effect, but for forward delivery only, are as follows:

Carriage bolts, small, rolled thread, 70 per cent off; cut thread, 65 and 10; large, 60 and 5. Machine bolts with h.p. nuts, small, rolled thread, 70 and 5; cut thread, 70; large, 60 and 10. Machine bolts with c.p.c. and t. nuts, small, 65 and 5; large, 60. Bolt ends with h.p. nuts, 60 and 10; with c.p. nuts, 60. Blank bolts, 60 and 10. Lag screws (cone or gimlet point), 70 and 10. Rough stud bolts, 50. Forged set screws and tap bolts, 35. H.p. sq. nuts, tapped or blank, $4 off list; h.p. hex., $4.20; c.p.c. and t. sq. nuts, tapped or blank, $3.75; c.p.c. and t. hex, $4.75. Semi-finished hex. nuts, 75 and 10. Finished and case hardened nuts, 75. Rivets, 7/16 in. diameter and smaller, 70 and 10. These prices are delivered in lots of 300 lb. or more where the actual freight rate does not exceed 20c. per 100 lb.

Merchant Steel.—The new demand continues very heavy, with the mills back in deliveries 10 to 12 weeks or longer. Premiums of $3 to $5 per ton over regular prices are easily obtained for deliveries in three to four weeks. On small lots for forward delivery we quote: Iron finished tire, ½ x 1½ in. and larger, 2.05c., base; under ½ x 1½ in., 2.20c., planished tire, 2.25c.; channel tire, ¾ to ⅞ and 1 in., 2.55c. to 2.65c.; 1 x ⅛ in. and larger, 2.95c.; toe calk, 2.65c. to 2.75c., base; flat sleigh shoe, 2.40c.; concave and convex, 2.45c.; cutter shoe, tapered or bent, 2.95c. to 3.05c.; spring steel, 2.65c. to 2.75c.; machinery steel, smooth finish, 2.45c.

Cold Rolled Strip Steel.—Prices are now firmly on a $4 basis, while premiums are paid for small lots for prompt delivery. Mills report they are sold up to July or longer. An extra charge of 15c. is now made for boxing material, and also about the same charge in most cases for burlapping. A partial list of extras, that are standard with all the makers, is as follows:

Base price for 1½-in. and wider, hard, in coils, 0.10 to 0.19 carbon. Extras for size, annealing, cutting, etc., as follows:

	0.100-in. and thicker	0.050-in. to 0.099-in.	0.036-in. to 0.049-in.	0.035-in.	0.031-in. to 0.034-in.	0.026-in. to 0.030-in.	0.025-in.	0.020-in. to 0.024-in.
Thickness								
Extra for thickness	...	.05	.20	.20	.35	.45	.45	.55
Extra for annealing	.25	.25	.25	.25	.40	.40	.40	.40
Width Extras								
Under 1½ to 1-in. inc.	.15	.15	.15	.15	.15	.15	.15	.15
Under 1 to ¾-in. inc.	.30	.30	.30	.30	.30	.30	.30	.30
Wider than 6, not over 9-in.	...	...	...	...	...	...	.25	.25
Wider than 9, not over 12-in.	...	...	...	.25	.25	.25	.50	.50
Wider than 12, not over 15-in.	...	...	...	.50	.50	.50	...	...
Cut Lengths Extras								
1-in. and wider	.10	.15	.15	.15	.25	.40	.40	.50
Under 1-in. to our limits	.25	.50	.50	.50	.75	.75	.75	.75

Reductions for carload lots of a size. For orders 18 tons or over, one width and gage, shipment at one time, there is a regular reduction from the net price of 15c. per cwt.

For all tempers other than full hard for flat work add annealing extra.

Carwheels.—The two local makers of steel carwheels have their output sold for the remainder of this year, but both are making extensions to their plants which will greatly increase their capacity. We quote 33-in. freight carwheels in lots of 1000 or more at $18; 33-in. tender wheels, $21; 36-in. passenger or tender wheels, $25. These prices are based on a 10-in. diameter hub, 50c. extra being charged for 11-in., all f.o.b. Pittsburgh.

Rivets.—The demand is still very heavy and makers of rivets say that, as deliveries of steel from the mills are much delayed, they are back on deliveries on rivets eight to ten weeks or longer. Export shipments are again shut off on account of the railroad embargo and prices are advanced $2 per ton. We quote button-head structural rivets, ½ in. and larger, at $2.70, and cone-head boiler rivets at $2.80 per 100 lb., in carload lots, f.o.b., Pittsburgh, smaller lots bringing about 10c. advance.

Wrought Pipe.—Mills report the new demand for both iron and steel pipe very heavy and state they are running close to 100 per cent of capacity. On account of the heavy demand for pipe and the continued advances in steel higher prices on pipe are looked for in the near future. The discounts now in effect on black and galvanized iron and steel pipe are given on another page of this issue.

Boiler Tubes.—Makers of iron boiler tubes have adjusted their list prices to conform to the list prices on steel tubes issued by the National Tube Company under date of Jan. 19 in accordance with American Society of Mechanical Engineers specifications. While the list prices have been changed on iron tubes there is no change in the discounts which are given on another page.

Old Material.—The local scrap market is dull, consumers evidently being covered for the time being. Prices are soft and on heavy steel scrap are about 25c. lower. Dealers are offering scrap more freely than they were some time ago. The local demand for foundry scrap is also dull, due largely to the molders' strike in this district which started Dec. 13. The steel mills are melting more scrap now than at any time for some years, but at the same time they are making more. No important sales were made in the last week, but dealers believe the demand will soon be better. Dealers quote for delivery in the Pittsburgh and nearby districts that take the same rates of freight as follows, per gross ton:

Heavy steel melting scrap, Steubenville, Follansbee, Brackenridge, Sharon, Monessen, Midland and Pittsburgh delivery	$17.00 to $17.25
Compressed side and end sheet scrap	16.25 to 16.50
No. 1 foundry cast	15.75 to 16.00
Bundled sheet scrap, f.o.b. consumers' mills, Pittsburgh district	14.50 to 15.00
Rerolling rails, Newark and Cambridge, Ohio, Cumberland, Md., and Franklin, Pa.	18.00 to 18.25
No. 1 railroad malleable stock	15.50
Railroad grate bars	10.75 to 11.00
Low phosphorus melting stock	20.00 to 20.50
Iron car axles	24.50 to 25.00
Steel car axles	26.00 to 26.50
Locomotive axles, steel	24.00 to 24.50
No. 1 busheling scrap	15.00
Machine shop turnings	9.75 to 10.00
Old carwheels	14.50
Cast-iron borings	10.75 to 11.00
*Sheet bar crop ends	18.00 to 18.50
Old iron rails	16.00 to 16.50
No. 1 railroad wrought scrap	18.50 to 19.00
Heavy steel axle turnings	13.50 to 14.00
Heavy breakable cast scrap	13.50 to 14.00

*Shipping point.

Coke.—On account of a shortage in supply of cars last week, prices on prompt furnace coke advanced sharply and it sold late last week at $3.75 per net ton at oven, one sale of 15 cars being reported at that price. However, the supply of cars this week is better and prompt furnace coke is lower. There is no demand for contract furnace coke, furnaces that buy in the open market being covered. We now quote best grades of blast-furnace coke for spot shipment at $3.25 to $3.50 and on contracts $2.50 to $2.75 per net ton at oven. We quote best grades of 72-hr. foundry coke for prompt shipment at $3.50 to $3.75 and on contract $3.25 to $3.50 per net ton at oven. The Connellsville *Courier* reports the output of coke for the week ended Jan. 29 as 442,616 net tons, an increase over the previous week of 41,810 tons.

Chicago

CHICAGO, ILL., Feb. 9, 1916.—(*By Wire.*)

Shipments, for the time being, appear to be the most accurate index of the state of business. In December and January the largest interest exceeded its rated output of rolled steel by a total of 60,000 tons. Pig iron is going forward at a better rate than in January. But specifications have so far anticipated contract schedules, and contracting has been so effectively inhibited by mill conditions that neither is representative of the activity of raw material users. For those industries whose business comes in the form of specific orders, January was a much quieter month than December or than February promises to be on the strength of the past week's showing. This is particularly true of the foundries. New projects in the manufacture of finished steel products which cannot be provided for from manufacturers' stocks or under mill contracts already existing are being deferred. For those manufacturers whose business has not been sufficiently desirable to win for them the consideration of the mills in the distribution of last half tonnage, and whose resources are unequal to the high level of store and premium mill prices, the last half promises a situation of unparalleled seriousness in the securing of material. Negotiations for cars reflect the unfavorable trend of prices and deliveries, although the Illinois Central Railroad is planning an expenditure of $3,000,000, represented in part by an inquiry for 1300 cars. Mill prices for far future delivery have been advanced to 2c., Pittsburgh, for shapes and bars and 2.10c. for plates. Inquiry for pig iron is being renewed, and some tonnage of importance for third quarter and last half is under consideration. Weakness in the scrap market is more pronounced.

Pig Iron.—The sale of 8500 tons of foundry iron, an intimation of which was made a week ago, has been

consummated and has been followed by a general increase of interest in both foundry and malleable iron. One melter of malleable iron in particular is inquiring for a round tonnage. A part of this inquiry is for third quarter delivery, but there also appears to be a reawakening of interest in last half shipments. With respect to price, the market shows no changes either for local or Southern iron, but the consideration which is being given to the shipment of iron from Alabama for steel making in Northern plants of the Steel Corporation affords the promise of a technically stronger situation in the South as to the price of foundry iron. For Lake Superior charcoal iron we quote delivery prices at Chicago, including a freight of $1.75. The following quotations are for iron delivered at consumers' yards, except those for Northern foundry, malleable Bessemer and basic iron, which are f.o.b. furnace, and do not include a switching charge averaging 50c. per ton:

Lake Superior charcoal, Nos. 2 to 5	$19.75
Lake Superior charcoal, No. 1	20.25
Lake Superior charcoal, No. 6 and Scotch	20.75
Northern coke foundry, No. 1	19.00
Northern coke foundry, No. 2	18.50
Northern coke foundry, No. 3	18.00
Southern coke, No. 1 f'dry and 1 soft	$19.50 to 20.00
Southern coke, No. 2 f'dry and 2 soft	19.00 to 19.50
Malleable Bessemer	19.00
Basic	18.00
Low phosphorus	32.00 to 36.00
Silvery, 8 per cent	27.50
Bessemer ferrosilicon, 10 per cent	30.50

(*By Mail*)

Rails and Track Supplies.—Except for a small tonnage taken by one of the roads of the Northwest for a branch extension, for early delivery, the week was void of rail purchases of interest. The Texas & Pacific was unable to place 8000 tons in this district last week. We quote standard railroad spikes at 2.25c., base; track bolts with square nuts, 2.50c., base, all in carload lots, Chicago; tie plates, $40, f.o.b. mill, net ton; standard section, Bessemer rails, Chicago, 1.25c., base; open hearth, 1.34c.; light rails, 25 to 45 lb., 1.52c.; 16 to 20 lb., 1.57c.; 12 lb., 1.62c.; 8 lb., 1.67c.; angle bars, 1.50c., Chicago.

Structural Material.—The Crane Company has awarded the contract for a part of its building requirements, of which mention was made a few weeks ago, placing 1900 tons with the South Halsted Street Iron Works. The Decatur Bridge Company will furnish 550 tons for a building at Peoria, Ill., and the American Bridge Company took two small jobs calling for 255 and 120 tons respectively. In new projects of an architectural nature there is very little offering. Frequent reports are heard of projects deferred because of the high level of prices, but the backwardness of the structural demand for many months past detracts from the importance of such explanations. There has been practically no placing of orders for cars against the larger inquiries which have been outstanding for some time, but a number of small lots of 100 and less are noted among recent orders. The Illinois Central Railroad has put out an inquiry for a total of 1300 cars of various descriptions. The price for far forward mill delivery has been advanced to the basis of 2c., Pittsburgh, and we quote on such contracts for Chicago delivery from mill 2.189c.

Local jobbers are making a conspicuous effort to conserve their stocks and in many instances are declining to consider orders which in tonnage exceed normal purchases out of stock. Store prices are unchanged and we quote for Chicago delivery 2.50c.

Plates.—The pinch of materials shortage promises to be more severely felt among plate users than in any other direction. The difficulty of advancing prices for finished products, such as boilers, tanks and similar equipment, in proportion to the increase in raw material prices will make the quotations out of store or from mill, for prompt delivery, well nigh prohibitive. The price of plates for far future delivery has been advanced to 2.10c., Pittsburgh, and we quote for Chicago delivery from mill on such contracts 2.289c.

We quote for Chicago delivery of plates out of stock 2.70c.

Sheets.—The quotation of 3c. for No. 28 black sheets appears to be applicable to highly finished grades rather than to the regular one-pass sheets for which the price of 2.65c. to 2.70c., Pittsburgh, continues to obtain. There is little regularity in quotations, the mills quoting as the particular circumstances suggest. We quote for Chicago delivery from mill, No. 10 blue annealed, 2.939c.; No. 28 black, 2.839c. to 2.889c.; No. 28 galvanized, 4.689c. to 5c.

The price of blue annealed sheets out of stock has been advanced $3 per ton and we quote for Chicago delivery from jobbers' stock as follows, minimum prices applying on bundles of 25 or more: No. 10 blue annealed, 2.95c.; No. 28 black, 3c.; No. 20 and heavier galvanized, 4.80c.; No. 22 and lighter, 5c.

Bars.—The lack of uniformity in the market and the wide variation in quotations are illustrated by prices of 1.95c. and 2c., made for early shipment of steel bars. Contemporary with these quotations are sales at prices ranging from 2.25c. to 2.50c., Pittsburgh. Demand for iron bars and high-carbon steel bars is only moderately heavy but with the approach of the season of reinforced concrete building the demand for high-carbon bars will doubtless be accentuated by reason of the scarcity of mild steel. We quote mill shipments, Chicago, as follows: Bar iron, 1.90c.; soft steel bars, 2.189c.; hard steel bars, 1.90c. to 2c.; shafting, in carloads, 45 per cent off; less than carloads, 40 per cent off.

We quote store prices for Chicago delivery: Soft steel bars, 2.50c.; bar iron, 2.50c.; reinforcing bars, 2.50c., base, with 5c. extra for twisting in sizes ½ in. and over and usual card extras for smaller sizes; shafting 30 per cent off.

Rivets and Bolts.—Consideration of new business by manufacturers of bolts and nuts is almost entirely prohibited in view of the difficulties of securing adequate raw material, and even the current scale of operations necessary to keep pace with specifications is in many instances curtailed for the same reason. We quote as follows: Carriage bolts up to ⅜ x 6 in., rolled thread, 70; cut thread, 65-10; larger sizes, 60-5; machine bolts up to ⅜ x 4 in., rolled thread, with hot pressed square nuts, 70-5; cut thread, 70; larger sizes, 60-10; gimlet point coach screws, 70-10; hot pressed nuts, square, $4 off per 100 lb.; hexagon, $4.20 off. Structural rivets, ¾ to 1¼ in., 2.60c. to 2.65c., base, Chicago, in carload lots, boiler rivets, 10c. additional.

We quote prices, out of store: Structural rivets, 2.75c.; boiler rivets, 2.85c.; machine bolts up to ⅜ x 4 in., 70-12½; larger sizes, 65-10; carriage bolts up to ⅜ x 6 in., 70-5; larger sizes, 65 off; hot pressed nuts, square, $4.50, and hexagon, $4.70 off per 100 lb.; lag screws, 75.

Cast-Iron Pipe.—The United States Cast Iron Pipe & Foundry Company has taken the contract for 1000 tons of pipe at Duluth. At Milwaukee no award has been made of the 1500 tons for which tenders were received last week. At Kansas City bids are asked on 1100 tons. We quote as follows, per net ton, Chicago: Water pipe, 4 in., $32.50 to $33; 6 in. and larger, $29.50 to $30, with $1 extra for class A water pipe and gas pipe.

Wire Products.—Fence makers report an unusually active season which reflects itself in heavy specifications for plain wire. While the retail demand in other lines has hardly been proportionate to the buying from mill by jobbers and manufacturers, there is little doubt that that trade will develop in a degree sufficient to tax the available supply of material. We quote to jobbers as follows: Plain wire, No. 9 and coarser, base, $2.239; wire nails, $2.389; painted barb wire, $2.539; galvanized barb wire, $3.239; polished staples, $2.539; galvanized staples, $3.239, all Chicago.

Old Material.—Under the load of scrap offered for sale from every direction, the market is steadily sagging. Except for Massillon, Ohio, and Brackenridge, Pa., where embargoes are in effect against shipments from the West, there is still a fairly active demand in markets east of Chicago but local melters of scrap are buying little or nothing. A demand for heavy melting steel to apply against short orders is supporting the price of this material to a certain extent, but new demand is lacking in this direction as in others. No better indication of the relation between the needs of the melters and the supply of material available can be had than is found in the frequency of rejections. Rail-

road offerings of scrap last week were not of importance in view of the volume of scrap generally available. We quote for delivery at buyers' works, Chicago and vicinity, all freight and transfer charges paid, as follows:

	Per Gross Ton	
Old iron rails	$17.25	to $17.75
Relaying rails	19.50	to 20.50
Old carwheels	13.75	to 14.25
Old steel rails, rerolling	17.00	to 17.50
Old steel rails, less than 3 ft	16.50	to 16.75
Heavy melting steel scrap	14.75	to 15.25
Frogs, switches and guards, cut apart	14.75	to 15.25
Shoveling steel	14.50	to 15.00
Steel axle turnings	11.50	to 12.00
	Per Net Ton	
Iron angles and splice bars	$17.00	to $17.25
Iron arch bars and transoms	18.00	to 18.50
Steel angle bars	14.00	to 14.50
Iron car axles	19.50	to 20.00
Steel car axles	21.50	to 22.00
No. 1 railroad wrought	15.00	to 15.50
No. 2 railroad wrought	14.00	to 14.50
Cut forge	14.00	to 14.50
No. 1 busheling	12.00	to 12.50
No. 2 busheling	8.75	to 9.00
Pipes and flues	11.00	to 11.50
Steel knuckles and couplers	14.50	to 15.00
Steel springs	15.25	to 15.75
No. 1 boilers, cut to sheets and rings	10.50	to 11.00
Boiler punchings	13.75	to 14.25
Locomotive tires, smooth	17.00	to 17.50
Machine shop turnings	8.50	to 8.75
Cast borings	7.50	to 8.00
No. 1 cast scrap	12.75	to 13.00
Stove plate and light cast scrap	10.75	to 11.00
Grate bars	11.00	to 11.25
Brake shoes	10.25	to 10.75
Railroad malleable	13.25	to 13.50
Agricultural malleable	11.00	to 11.50

Philadelphia

PHILADELPHIA, PA., Feb. 8, 1916.

The one topic of the pig-iron market in the last week was the buying of nearly 80,000 tons of basic iron by the Lukens Iron & Steel Company, for delivery in the last five months of the year at $19.50, delivered. It is expected that this large purchase will have a reassuring effect on consumers of all grades of iron, and that a much more active market will prevail this month or early in March. Foundry iron has had a quiet tendency, but prices are a little stronger, because of the elimination of some resale lots. Consumers of steel continue to almost beg for prompt or nearby deliveries, and the nominal quotations are higher by $2 per ton, but 2c. or 2.10c., Pittsburgh, for plates, shapes and bars, does not indicate what is paid by those who must have material. Plates are the most difficult to obtain, after which come bars. Some large inquiries are being made for shell-making steel rounds, but the mills are not eager to contract, even for forward deliveries, at 2.75c., the price offered.

Pig Iron.—The Lukens Iron & Steel Company in the past week closed for 77,500 tons of basic for delivery in the last five months of this year. The business was apportioned among four sellers in lots of 10,000, 12,500, 20,000 and 35,000 tons, the last-named quantity being divided between two furnaces, and the total amount may reach 80,000 tons, making one of the largest transactions on record in this territory. The price was $19.50 per ton, delivered, for the entire tonnage. The Lukens Iron & Steel Company is taking iron as fast as the furnaces can ship, although this means more than current needs demand, also the disadvantage of unloading by hand. The situation in foundry iron is unchanged, and the market cannot be called active, although all interests are doing something, and there is a growing feeling that a good buying movement will develop this month or early in March. Quotations are unchanged at $20, furnace, or $20.75, Philadelphia, for eastern Pennsylvania No. 2 X, and $18, furnace, or $20.75, Philadelphia, for Virginia No. 2 X. Concessions on Virginia iron have practically disappeared. The Baldwin Locomotive Works has closed for a few thousand tons of cylinder and floor iron for which it inquired a few days ago, but the prices paid have not been reported. Some of the sellers appear to be puzzled as to why their bids were not accepted. The Pennsylvania Railroad has closed for 200 tons of charcoal iron, though it inquired for 1000 tons, and is now inquiring for 700 tons of high manganese iron, 100 tons of low silicon and 1500 tons running 2.5 to 3 per cent silicon. Low phosphorus is firm at about $32, Philadelphia, and a couple of thousand-ton lots were taken in the week. Quotations for standard brands, delivered in buyers' yards, prompt shipment, range about as follows:

Eastern Pa., No. 2 X foundry	$20.00	to $20.75
Eastern Pa., No. 2 plain	19.75	to 20.50
Virginia, No. 2 X foundry		20.75
Virginia, No. 2 plain		20.25
Gray forge	19.00	to 19.75
Basic	19.50	to 20.00
Standard low phosphorus		32.00

Iron Ore.—No foreign ore arrived at this port in the week ended Jan. 5.

Ferroalloys.—Prompt 80 per cent ferromanganese easily commands about $200, seaboard, while the quotation for last half is unchanged at $125 for limited quantities. Offerings of forward deliveries are fewer for the reason that some of the English makers have booked about all they can produce. The mills have contracted heavily for future material, but nevertheless are not assured of all they will need at the present rate of steel production. Arrivals at this port last week consisted of 346 tons from England.

Bars.—The nominal quotation for steel bars is 2c., Pittsburgh, or 2.159c., Philadelphia, but it is almost impossible to place orders for prompt delivery at this figure. Business is turned away without hesitancy, and would-be buyers find themselves referred from one mill to another. Consumers, in some cases, approach sellers whom they have not favored with orders for years and promise to give them their future business if helped out at this time, but it does little good, the mills not infrequently replying that they are taking care of their friends only. One maker is reported to have taken considerable prompt business at premium prices. The shortage of bars is bothering the railroads quite as much as other consumers. For iron bars the quotation is 2.25c., Pittsburgh, or 2.409c., Philadelphia, for carload lots. Steel rounds for shell-making are active, especially for last-half delivery. Pittsburgh interests are offering business at 2.75c., which the mills regard as too low. Doubt is expressed as to the tonnage which has been booked at this figure.

Plates.—The plate situation is tighter than ever, and orders for thousands of tons are being turned down. Two leading mills quote 3c., but they have none to deliver for several months, both being oversold. A nearby mill asks 2.809c. to 3.059c., Philadelphia, depending on delivery. Export business is not being considered in several instances. Specifications from shipyards, locomotive works and other consumers are heavy. The Pennsylvania Railroad is endeavoring to place orders for 4000 to 5000 tons of plates and an equal tonnage of bars and shapes. The Lenoir Car Works, Lenoir City, Tenn., is in the market for 10,000 tons of car material, but is having difficulty in getting plates, and without them can do nothing.

Rails.—Considerable foreign inquiry is reported, the bulk of it from Europe, although rails are wanted also in Cuba and South America.

Structural Material.—Eastern Pennsylvania makers continue to ask 2.259c., Philadelphia, this being their minimum. On miscellaneous lots of shapes they quote 2.409c., Philadelphia. The volume of demand shows no diminution. An extension to the Baldwin Locomotive Works at Eddystone calls for 850 tons. The Delaware & Hudson Railroad has placed 600 tons of bridge work with the Pennslyvania Steel Company.

Billets.—Local makers have little to sell, but the demand continues strong. Forward deliveries are quoted at $40 to $45 for open-hearth rerolling billets, and $55 to $60 for forging billets.

Sheets.—Quotations are unchanged at 2.905c. to 3.159c., Philadelphia, for No. 10 blue annealed. The pressure of demand is maintained.

Coke.—Not only has the freight situation upset the market, but some makers are filled with orders. Prompt foundry is quoted at $4 to $4.50 per net ton at oven, and prompt furnace at $3.25 to $3.75. Contract foundry is quoted at $3.25 to $3.75, and first half furnace at $2.50 to $2.75. Freight rates from the principal producing districts are as follows: Connellsville, $2.05; Latrobe, $1.85, and Mountain, $1.65.

Old Material.—No great change is apparent in the market. Heavy melting steel continues strong, but rolling mill scrap is a trifle weaker. The railroad freight situation hampers both buyers and sellers. Quotations for delivery in buyers' yards in this district, covering eastern Pennsylvania, and taking freight rates from 35c. to $1.35 per gross ton, are as follows:

No. 1 heavy melting steel	$16.50 to $17.00
Old steel rails, rerolling	19.00 to 20.00
Low phos. heavy melting steel scrap	21.50 to 22.50
Old steel axles	25.00 to 26.00
Old iron axles	27.00 to 28.00
Old iron rails	19.50 to 20.00
Old carwheels	16.50 to 17.00
No. 1 railroad wrought	22.00 to 22.50
Wrought-iron pipe	15.25 to 15.75
No. 1 forge fire	14.00 to 14.50
Bundled sheets	14.00 to 14.50
No. 2 busheling	11.00 to 11.50
Machine shop turnings	10.00 to 10.50
Cast borings	11.00 to 11.50
No. 1 cast	17.00 to 18.00
Grate bars, railroad	12.50 to 13.00
Stove plate	13.00 to 13.50
Railroad malleable	15.00 to 15.50

Cleveland

CLEVELAND, OHIO, Feb. 8, 1916.

Iron Ore.—Shipments from Lake Erie docks in January broke all records, amounting to 887,426 gross tons as compared with 249,123 tons shipped in the corresponding month a year ago. The largest previous January dock shipments were made in 1913 when 842,952 tons went to the interior furnaces. The stock of ore on the Lake Erie docks Feb. 1 was 7,071,275 tons as compared with 7,802,806 tons a year ago. If the dock shipments keep up the next three months at the proportionate rate established in January there will be less than 4,000,000 tons on the docks when navigation opens May 1. The market is inactive. We quote prices as follows, delivered lower Lake ports: Old range Bessemer, $4.45; Mesaba Bessemer, $4.20; old range non-Bessemer, $3.70; Mesaba non-Bessemer, $3.55.

Pig Iron.—The market is unusually quiet. While some small sales of foundry grades are being made, most of the 50 per cent or more of the consumers who have not yet purchased their last half iron are still staying out of the market. Only one sale of any size, a 1000-ton lot of northern Ohio foundry, for last half delivery, is reported. Prices are apparently well maintained at $19, Cleveland, for No. 2 foundry, and $18.50 for shipment from Cleveland and Valley furnaces. The throwing on the market of considerable resale Southern iron has resulted in the softening of Southern prices. This iron is offered at $14.25, Birmingham, for No. 2 for prompt shipment. One Tennessee furnace has reduced its price 50c. per ton to $14.50 for first half and $15 for last half. Alabama furnaces continue to ask prices 50c. to $1 higher. The market is not active although a few small sales are reported. Ohio silvery iron is firm at $25 for 8 per cent and we note several sales aggregating 1000 tons for last half delivery at that price. There is considerable inquiry for low phosphorous iron for both first and last half and this iron is scarce for the earlier delivery. We quote, delivered Cleveland, as follows:

Bessemer	$21.45 to $21.95
Basic	18.95 to 19.30
Northern No. 2 foundry	19.30
Southern No. 2 foundry	18.25 to 19.00
Gray forge	18.30
Jackson Co. silvery 8 per cent silicon	26.62
Standard low phos., Valley furnace	32.00

Coke.—The market is quiet. Prices on foundry grades are firm. Owing to the car shortage, high prices are asked for spot foundry coke, some carload lots being sold as high as $5 per net ton at oven. We quote standard Connellsville foundry coke at $3.75 to $4.50 per net ton at oven for prompt shipment and $3.50 to $3.75 for contracts for best makes. We note the placing of a contract for Indianapolis by-product coke in this territory at $4.30 at oven for first half.

Bolts, Nuts and Rivets.—The demand for bolts and nuts continues active and prices are firm. There is a heavy demand for rivets from car, locomotive and shipbuilding companies, and the recent advance in prices is being maintained in this market. In addition to the trouble in getting deliveries of steel, rivet makers are confronted with a shortage of crude oil. Not only is the supply scarce but fuel oil prices have been advanced considerably. Bolt and nut discounts are as follows:

Common carriage bolts ⅝ and 6 in., smaller or shorter, rolled thread, 70 off, cut thread, 65 and 10; larger or longer, 60 and 5; machine bolts with h. p. nuts, ⅝ x 4 in., smaller and shorter, rolled thread, 70 and 5; cut thread, 70, larger and longer, 60 and 10; lag bolts, gimlet or cone point, 70 and 10, square h.p. nuts, blank or tapped, $4 off the list; hexagon h.p. nuts, blank or tapped, $4.20 off; c.p.c. & t. square nuts, blank or tapped, $3.75 off; hexagon nuts, 11 sizes, $4.75 off; cold pressed semi-finished hexagon nuts, all sizes, 75 and 10 off.

Old Material.—The market is more active than during the previous week or two but prices are weak in spots. With the recent heavy shipments the mills are well supplied, but with the present cold weather shipments will fall off and dealers look for a stiffening in prices. Local mills are taking on heavy melting steel scrap at $16.25 to $16.50, and some tonnage was sold in Youngstown the past few days at $17 to $17.50, going mostly to dealers to cover the sales made to the Brier Hill Steel Company, which recently bought a large tonnage. Turnings are a drug on the market and weak. Railroad malleable, iron car axles and steel axle turnings have also declined slightly in price. Busheling is firm although two local mills are not taking shipments. We quote, f.o.b. Cleveland, as follows:

Per Gross Ton

Old steel rails	$16.50 to $17.00
Old iron rails	19.00
Steel car axles	25.00 to 26.00
Heavy melting steel	16.00 to 16.50
Old carwheels	14.00 to 14.50
Relaying rails, 50 lb. and over	22.50
Agricultural malleable	14.00 to 14.25
Railroad malleable	16.75 to 17.00
Steel axle turnings	13.25 to 13.50
Light bundled sheet scrap	12.75 to 13.25

Per Net Ton

Iron car axles	$23.00 to $24.00
Cast borings	8.50 to 9.00
Iron and steel turnings and drillings	7.25 to 7.75
No. 1 busheling	14.50 to 14.75
No. 1 railroad wrought	17.50 to 18.00
No. 1 cast	13.50 to 14.00
Railroad grate bars	10.50 to 11.00
Stove plate	10.50 to 11.00

Finished Iron and Steel.—The new demand has increased and consumers are pressing mills harder than ever for steel for specific work and for contracts. Not only are consumers becoming very anxious to place third quarter contracts but many are not covered for the second quarter. Being unable to contract for their steel requirements, some manufacturers are closing contracts for the sale of their products for the third quarter subject to their ability to secure plain steel bars and forged bars and subject to the price they must pay for their raw material. Mill prices have been advanced to 2c., Pittsburgh, for steel bars and structural material, and to 2.10c. for plates, for orders accompanied by specifications, which means for the most part fourth quarter deliveries. For early shipment steel bars are quoted at 2.35c. to 2.50c., Pittsburgh, and we note the sale of several thousand tons at the latter price for delivery extending into July. The Cleveland steel-bar making capacity was increased by the starting up today on large rounds of the new 21-in. mill of the Union Rolling Mill Company. In structural lines the Burger Iron Company, Akron, has taken 2500 tons for a factory building for the Goodyear Tire & Rubber Company and the Riverside Bridge Company has taken 730 tons for a factory building for the Parish & Bingham Company, Cleveland. The Baltimore & Ohio Railroad has an inquiry out for about 3000 tons for bridge work. The American Shipbuilding Company is understood to have taken orders for five additional boats of the Norwegian type which require 1100 tons of steel each. The New York Central Railroad has an inquiry out for 150 locomotives which will require 6000 tons of steel. The Toledo Railway & Light Company has placed 1000 tons of rails with the Lackawanna Steel Company. The demand for plates is heavy and local prices are unchanged at 2.75c. to 3c., Pittsburgh, for early delivery. Forging steel bars are in heavy demand. The price of hard steel

bars has been further advanced to 2.10c., Pittsburgh, for early delivery and the demand is heavy. Iron bars are unchanged at 2.35c., Cleveland. Sheets are firm at 2.60c. to 2.75c., Ohio mill, for No. 28 black and No. 10 blue annealed, and at 4.75c. to 5c. for No. 28 galvanized. Warehouse prices on shafting have been advanced to 20 per cent off. Other warehouse prices are unchanged at 2.60c. for steel bars and 2.70c. for plates and structural material.

Buffalo

BUFFALO, N. Y., Feb. 8, 1916.

Pig Iron.—Sales for the past week aggregated about 15,000 tons, of all grades. A considerable proportion consisted of resale iron, of which there does not appear much more now available. Prices have shown a stiffening tendency. The continuance of railroad embargoes is the only disquieting feature. We quote as follows, f.o.b., furnace, Buffalo, for current and last half delivery:

No. 1 foundry	$18.75 to $19.00
No. 2 X foundry	18.50 to 18.75
No. 2 plain	18.50
No. 3 foundry	18.00 to 18.50
Gray forge	18.00 to 18.50
Malleable	19.00 to 20.00
Basic	19.00 to 20.00
Charcoal, regular brands and analyses	21.00 to 22.00

Finished Iron and Steel.—Mills are fully as conservative as they have been about entertaining new obligations. While prices have advanced, this will make comparatively little difference in new bookings because of the small tonnage open for sale. Producers are concerned about shipping what has been sold rather than in committing themselves for new business. For many of the smaller manufacturers the shortage of steel is becoming a more serious problem, because jobbers' stocks are becoming more and more depleted. Steel bars and structural shapes are now held at 2c., base, and plates at 2.10c., Pittsburgh. On cold rolled steel the minimum prices are 42 per cent off for carloads and 37 per cent off for less than carloads; with some of the manufacturers allowing only 40 off for carloads and 35 off for less than carloads. Jobbers are selling from stock at 20 per cent from list. Warehouse prices have been advanced $2 per ton making steel bars and structural shapes 2.70c., base, f.o.b., Buffalo, except for rounds and squares 2 in. and over in size, which are 3.40c., Buffalo, and plates 3c., all taking 5c. extra for store door delivery. The Phoenix Bridge Company has taken 500 tons for an Oswego River bridge at Minetto, N. Y.

Old Material.—No change in prices has occurred, although a considerable amount of new business was transacted in most of the commodities of the regular list. Several good sized sales of heavy melting steel are reported at about the maximum price ruling last week—$17, f.o.b., Buffalo. Indications point to an advance in this commodity in the near future, a large and steady demand seeming to be assured because the capacity of steel mills is taken up practically to the end of the third quarter. Dealers anticipate this will insure a general strengthening of prices all along the line before a great while. We quote dealers' asking prices, per gross ton, f.o.b. Buffalo, as follows:

Heavy melting steel	$16.50 to $17.00
Low phosphorus steel	21.00 to 21.50
No. 1 railroad wrought scrap	19.00 to 19.50
No. 1 railroad and machinery cast, scrap	16.00 to 16.50
Old steel axles	24.00 to 24.50
Old iron axles	24.00 to 24.50
Old carwheels	15.25 to 15.75
Railroad malleable	15.25 to 15.75
Machine shop turnings	7.75 to 8.25
Heavy axle turnings	12.00 to 12.50
Clean cast borings	9.25 to 9.75
Old iron rails	17.50 to 18.00
Locomotive grate bars	11.50 to 12.00
Stove plate (net ton)	11.00 to 11.50
Wrought pipe	13.00 to 13.50
Bundled sheet scrap	12.00 to 12.50
No. 1 busheling scrap	14.50 to 15.00
No. 2 busheling scrap	11.00 to 11.50
Bundled tin scrap	15.00 to 15.50

Cincinnati

CINCINNATI, OHIO, Feb. 8, 1916.—(*By Wire.*)

Pig Iron.—Inquiry is light and only a few sales of importance have been made in this territory. The largest sale reported covers 500 tons of Southern foundry iron and 500 tons of malleable bought by a central Ohio consumer. An inquiry is out from the same section for 500 tons of Northern foundry for last half shipment. No confirmation can be obtained of the rumor that Ohio silvery has been shaded below $25 at furnace for an 8 per cent analysis on any of the large contracts recently closed. Only a few small transactions in Ohio silvery occurred the past week. Northern foundry, malleable and basic are firm at $18, Ironton, although contracts for shipment through the year can be made at the same figures. The Southern price question is perplexing; while the bulk of contracts made for first half shipment is at $15, Birmingham basis, there is yet some furnace and resale iron obtainable at $14.50. Several consumers in northern Ohio are feeling the market for a last half supply of foundry iron, but in case this business comes to a head orders will probably be placed with Northern furnaces. Based on freight rates of $2.90 from Birmingham and $1.26 from Ironton, we quote, f.o.b. Cincinnati, as follows:

Southern coke, No. 1 f'dry and 1 soft	$18.40 to $18.90
Southern coke, No. 2 f'dry and 2 soft	17.90 to 18.40
Southern coke, No. 3 foundry	17.40 to 17.90
Southern No. 4 foundry	16.90 to 17.40
Southern gray forge	16.40 to 16.90
Ohio silvery, 8 per cent silicon	26.26 to 26.76
Southern Ohio coke, No. 1	20.76 to 21.26
Southern Ohio coke, No. 2	19.76 to 20.26
Southern Ohio coke, No. 3	19.26 to 19.76
Southern Ohio malleable Bessemer	19.26 to 19.76
Basic, Northern	19.26 to 19.76
Lake Superior charcoal	21.20 to 22.20
Standard Southern carwheel	25.40 to 25.90

(*By Mail*)

Coke.—Connellsville prompt shipment prices appear to be going back to a more normal basis, and spot 48-hr. coke can now be bought around $3.10 to $3.50 per net ton at oven and 72-hr. coke, $4 to $4.50. Contract figures are $2.30 to $2.60 for furnace coke and $3.25 to $3.75 for foundry grades. We quote Wise County and Pocahontas furnace coke at $2.75 to $3 and foundry coke from $3.35 to $3.75. Not much business is reported from any source.

Finished Material.—Jobbing houses report an improvement in business, although it is of not enough magnitude to indicate that it is of a permanent nature. The warehouse price on No. 28 galvanized sheets is firm at 5c., Cincinnati. The mill price is also strong at 5.15c., Cincinnati, or Newport, Ky., and on No. 28 black at 2.65c. We quote from jobbers' stock wire nails at $2.30 per keg base and barb wire at $3.20 per 100 lb. Steel bars are now quoted at 2.60c.; No. 10 blue annealed sheets, 3c.; plates, ¼-in. and over, 2.75c.; rounds, 2-in. and over, 3.10c., base; flats, 1 in. thick and over, 2.85c.

Old Material.—The market is somewhat erratic and prices are weaker. This condition is said to have been brought about by the large shipments that have been received by dealers lately as against a curtailment of the outward movement of scrap. The minimum prices given below represent what dealers are willing to pay for delivery in their yards, southern Ohio and Cincinnati, and the maximum quotations are dealers' prices, f.o.b. at yards.

Per Gross Ton

Bundled sheet scrap	$10.50 to $11.00
Old iron rails	15.25 to 15.75
Relaying rails, 50 lb. and up	20.75 to 21.25
Rerolling steel rails	14.00 to 15.00
Heavy melting steel scrap	14.00 to 14.50
Steel rails for melting	13.75 to 14.75

Per Net Ton

No. 1 railroad wrought	$13.25 to $13.75
Cast borings	7.25 to 7.75
Steel turnings	7.00 to 7.50
Railroad cast scrap	11.50 to 11.75
No. 1 machinery scrap	13.25 to 13.75
Burnt scrap	8.50 to 9.00
Iron axles	19.00 to 19.50
Locomotive tires (smooth inside)	13.00 to 13.50
Pipes and flues	10.00 to 10.50
Malleable and steel scrap	10.50 to 11.00
Railroad tank and sheet scrap	8.50 to 9.00

Birmingham

BIRMINGHAM, ALA., Feb. 7, 1916.

Pig Iron.—January was a quiet month and February entered with buying at the lowest ebb in several weeks. An estimate of last week's business does not go over 5000 to 6000 tons. Furnace operators express no surprise, nor seem concerned, treating the lull as the natural outcome of heavy bookings for the first half. The pace is set by the leading interest at $15 and $16 for first and second halves respectively, with the other makers asking $15.50 for first half and $16 to $16.50 for second half. Small lots have been recently sold at all these figures. It is probable that some pig iron has been sold by a Birmingham maker to regular customers for last half delivery at $15.50, being a part of orders for first half. Charcoal iron has brought $22.50 and is quite strong. High silicon iron sells around $17.50 for second half, the Alabama Company being practically out of the market for the first half. Southern consumption is quite large, owing to a heavy business in lathe manufacture for the Allies, a large amount of sugar-mill machinery for South America and an average consumption by the water, gas and soil pipe makers. The Alabama coke-iron output is now at the rate of 2,750,000 tons per annum and furnaces are in the pink of condition, several making new high records. The Alabama Company put in its repaired Ironaton stack on Etowah foundry iron Feb. 2 and the Gulf States Steel Company's stack resumed on basic Jan. 25. The active capacity in February is the largest on record. The Anniston Munitions Company's factory has begun operations and progress is being made on the electric steel furnace of the Alabama Company there. We quote, per gross ton, f.o.b. Birmingham district furnaces, as follows:

No. 1 foundry and soft	$15.50 to $16.00
No. 2 foundry and soft	15.00 to 15.50
No. 3 foundry	14.50 to 15.00
No. 4 foundry	14.25 to 14.75
Gray forge	14.00 to 14.50
Basic	15.00 to 15.50
Charcoal	22.50 to 23.00

Cast-Iron Pipe.—There has been no special activity in the pipe market, but orders have been sufficient to justify prospects of remaining on the present output scale. Much interest is felt in the prolonged stay in South America of J. R. McWane, of the American Cast Iron Pipe Company. The South American trade has been knocking at the door of Birmingham plants for 18 months, and several large sales have been made. Makers and brokers are inclined to probe deeper and learn South American trade conditions with more exactness. We quote, per net ton, f.o.b. pipe shop yards, as follows: 4-in., $26; 6-in. and upward, $24, with $1 added for gas pipe and small sizes of water pipe.

Coal and Coke.—The coke market is as strong as it could be. Brookwood and Yolande standard foundry makes are selling f.o.b. oven for $3.75 and $4 per net ton respectively. There is no furnace coke to be had. Foundry coke makers are sold up. The Woodward and Tennessee companies are rushing repair work on beehive ovens at Woodward and Bessemer. The Mexican movement is steady. Work has begun on the Koppers 37-oven by-product plant of the Gulf States Steel Company at Alabama City. It is understood that the Yolande Coal Company will also build one. The coal demand continues to improve with the cry for coke. The Adler, Pratt Consolidated, and probably other interests on the Warrior River, and at New Orleans, are seriously considering the installation of ocean-going barges from Mobile to New Orleans and other gulf ports, as well as to Cuban and South American ports.

Old Material.—The scrap market has not been quite so active, but a fair volume of business is being done and prices are firm. The expected advance in quotations was not made. We quote, per gross ton, f.o.b. dealers' yards, as follows:

Old iron axles	$14.50 to $15.00
Old steel axles	14.00 to 14.50
Old iron rails	13.50 to 14.50
No. 1 railroad wrought	10.50 to 11.00
No. 2 railroad wrought	9.00 to 9.50
No. 1 country wrought	9.00 to 9.50
No. 1 machinery cast	10.00 to 10.50
No. 1 steel scrap	10.00 to 10.50
Tram carwheels	10.00 to 10.50
Stove plate	8.00 to 8.50

St. Louis

ST. LOUIS, MO., Feb. 7, 1916.

Pig Iron.—Sales for the most part have been of small lots, but inquiries are outstanding for 400 tons of No. 2 Northern foundry and 1200 tons of basic. In prices there have been no changes, all grades being held firmly at last quotations. Specifications continue very free with a strong tendency to seek anticipation.

Coke.—The car situation, both as to supply and embargoes, leaves spot coke with prices at $5 to $6 at oven for 72-hr. best selected Connellsville. The by-product plant recently reported as a sharp competitor, has about sold up its first six months' supply. It has gained considerable headway with foundrymen who report satisfaction with the product.

Finished Iron and Steel.—Finished products are stiff at the new prices of 2c., Pittsburgh, for structural material and 2.10c. for plates. Buyers are willing to pay the price if they can get the material. Business continues well ahead of shipments and therefore adding to the unfilled tonnage. Orders are for small lots and it is the aggregate that is counting. Stock is moving out of warehouse at high figures and the buyers seem willing to pay the prices so long as they can get the material. We quote for stock out of warehouse as follows: Soft steel bars, 2.55c.; iron bars, 2.50c.; structural material, 2.55c.; tank plates, 3.60c.; No. 10 blue annealed sheets, 3.95c.; No. 28 black sheets, cold rolled, one pass, 3.20c.; No. 28 galvanized sheets, black sheet gage, 5.05c.

Old Material.—Scrap is firm and the softening tendency recently noted has disappeared, though very active buying has not been resumed. Mills are maintaining an embargo and this seems to be the chief reason for the quietness prevailing. Dealers are confident that fresh buying will send prices higher. Lists out include 500 tons from the Vandalia together with 325 tons of bridge material; 3800 tons from the Wabash, 4500 tons from the Southern and some small lots from industries. Relaying rails are in good demand, particularly for the lighter weights. We quote dealers' prices f.o.b. customers' works, St. Louis industrial district, as follows:

Per Gross Ton

Old iron rails	$15.25 to $15.75
Old steel rails, rerolling	16.50 to 17.00
Old steel rails, less than 3 ft	16.25 to 16.75
Relaying rails, standard section, subject to inspection	21.00 to 23.00
Old carwheels	13.25 to 13.75
No. 1 railroad heavy melting steel scrap	14.75 to 15.25
Heavy shoveling steel	13.00 to 13.50
Frogs, switches and guards cut apart	14.75 to 15.25
Bundled sheet scrap	9.75 to 10.25

Per Net Ton

Iron angle bars	$14.75 to $15.25
Steel angle bars	13.00 to 13.50
Iron car axles	19.75 to 20.25
Steel car axles	20.75 to 21.25
Wrought arch bars and transoms	16.75 to 17.25
No. 1 railroad wrought	14.25 to 14.75
No. 2 railroad wrought	13.75 to 14.25
Railroad springs	14.25 to 14.75
Steel couplers and knuckles	14.25 to 14.75
Locomotive tires, 42 in. and over, smooth inside	14.25 to 14.75
No. 1 dealers' forge	11.75 to 12.25
Mixed borings	7.75 to 8.25
No. 1 busheling	12.25 to 12.75
No. 1 boilers, cut to sheets and rings	9.75 to 10.25
No. 1 railroad cast scrap	11.75 to 12.25
Stove plate and light cast scrap	9.25 to 9.75
Railroad malleable	11.25 to 11.75
Agricultural malleable	9.75 to 10.25
Pipes and flues	9.75 to 10.25
Railroad sheet and tank scrap	9.00 to 9.50
Railroad grate bars	9.25 to 9.75
Machine shop turnings	9.25 to 9.75

The Alloyed Metal & Mfg. Company, 2337 Pope Avenue, St. Louis, Mo., has changed its name to National Art Bronze Works for the purpose of better facilitating its purposes. The company specializes in statuary of all sizes, groups, busts, relief panels, tablets, etc., and in ornamental and architectural bronze castings. It is equipped with adequate and modern facilities.

Platinum, in the producing districts of Russia, is said to have advanced to $35 per oz. because of large purchases by foreign countries.

New York

NEW YORK, Feb. 9, 1916.

Pig Iron.—The market has been quiet longer than producers expected, and the fact that prices stopped advancing six weeks ago while steel products have kept on going up is causing some comment, particularly as makers of basic iron in eastern Pennsylvania sold at $19.50, delivered, for the last five months of the year, when $20 had been their asking price. Actual lowering of foundry iron prices has not been reported, but the tone of the market is not as firm as in January. With consumption apparently at an increasing rate, apart from the minor interruptions of embargoes at some New England points, furnace men look for a stiffening of prices on the renewal of buying in the early spring and meanwhile for the holding of the market substantially at to-day's level. An inquiry of 800 tons is pending in New Jersey, and a 300-ton sale is reported in Brooklyn and another of like amount up the river. Buffalo No. 2 X iron has lately sold at $18 at furnace, but it is true also that offers on that basis by Eastern buyers have not gone through and that some sellers quote $18.50. A sale of 10,000 tons of iron on yard has been made at Buffalo to a steel company there which is about to begin making steel. The Pennsylvania Railroad embargo on pig-iron shipments into New England is still on, but some iron from central Pennsylvania has gone into that district by way of the Boston & Albany and Boston & Maine. The Norfolk & Western, because of a congestion at Norfolk, has embargoed iron from Roanoke and other Virginia furnaces intended for shipment to New England via steamer from Norfolk. The B. & O. raised its coke embargo Feb. 4 and that on the Pennsylvania Railroad was raised as far east as Waverly, N. J., but New England is still closed territory. We quote at tidewater as follows for early delivery: No. 1 foundry, $20.25 to $20.75; No. 2 X, $19.75 to $20; No. 2 plain, $19.25 to $19.50; Southern iron at tidewater, $20 to $20.50 for No. 1 and $19.50 to $20 for No. 2 foundry and No. 2 soft.

Ferroalloys.—Predictions are freely made that the steel trade will see a temporary and perhaps an extended famine in ferromanganese. It is pointed out that practically all of the British makers are out of the market for some time to come and some for the remainder of the year, while domestic production has fallen off sharply since last December. Anxiety on the part of many consumers is reported to be more pronounced than at any time in months, and the number and size of the inquiries are larger than for some time. In such cases the price or source is not the question, but only the ability to secure the alloy. Spot material has sold as high as $200, seaboard, with takers ready to absorb more at this or a higher price. Some metal of lower manganese content than 80 per cent has been sold the past week on a basis of $240 for the regular grade. Receipts from England on old contracts are from two weeks to a month behind promised deliveries, accentuating the scarcity. Some sales of good-sized lots have been made for the last half at the regular quotation of $125, seaboard, but with no guarantees as to deliveries. A Cleveland steel maker has taken 1000 tons for delivery after July 1. Spiegeleisen is in active demand with little available for near or forward delivery at $35 furnace. Several thousand tons of this alloy, 19 to 21 per cent. manganese, which was available the past week for delivery before July 1, was immediately sold at $40, furnace, mostly in small lots, but including one sale of 1000 tons. Ferrosilicon, 50 per cent, is in continued strong demand, with rumors of a new domestic producer about to enter the market.

Structural Material.—Industrial plant extensions are a factor of importance in the aggregate of material involved, though owing to the quiet nature of the buying, often without competition, this fact has not been appreciated. Fabricators have more on their books than even a few weeks ago and plain material prices are firmer in consonance with the increases for general lines of finished steel. The largest new project up for consideration involves 4000 tons, for a pier at West Forty-sixth Street, New York City, general bids for which go in Feb. 11. A garage at Springfield, Mass., 900 tons, is also up for figures. Contract awards include 800 tons for the Baldwin Locomotive Works at Eddystone, Pa., placed with the McClintic-Marshall Company, with 300 tons for the same works still unplaced; 300 tons for the court house at Durham, N. C., placed with the Richmond Structural Steel Company, and 300 tons for the Delaware & Hudson at Albany placed with the Pennsylvania Steel Company. Plain material is obtainable from the mill in six or more weeks at 2.169c. to 2.269c., New York, depending on the urgency of the shipment, but from the warehouse at 2.60c., New York.

Steel Plates.—The scrutiny exercised by the mills in selecting the offerings which best suit mill programs is closer than ever, and the market price for delivery in several weeks is an uncertain quantity. Quotations corresponding to 3c., Pittsburgh, are numerous, made because the business offered is not attractive at the moment, but no sales at this price have been noted. At the same time the price of 2.50c. named by some mills for relatively quick shipments has been withdrawn, and except for 3c. quoted for less than carload shipments, all other quotations are made on each special case by the mill itself. It appears, however, that 2.50c., Pittsburgh, can still be done on an attractive tonnage with delivery in, say, eight weeks, although the number of mills which can supply such material has been narrowed to a considerable extent. Two of the Eastern plate mills are practically out of the market, with little likelihood that they can make new commitments for delivery prior to Oct. 1. Plates are still sought for shipbuilding and the volume of foreign inquiry is great, although some of this comes from commission or importing houses in neutral countries of the too general nature of those put out months ago. We quote mill shipments of plates at 2.669c. and higher, New York, in several weeks and 2.269c., New York, for delivery in the third quarter. Plates are 2.90c., New York, from warehouse at this writing, but an early advance is expected.

Iron and Steel Bars.—Limited amounts of steel bars in a restricted number of sizes are obtainable in several weeks at about 2.50c., New York. Iron bars continue in strong demand at 2.419c., New York. Steel inquiries for third and fourth quarter are reaching the mills in increasing volume, but so difficult is it to promise deliveries accurately so far ahead that for this reason, at least in part, the mills generally are refusing to consider forward business as yet. What business of this class is being done has been placed at 2c., Pittsburgh, or 2.169c., New York. Steel and iron bars from the warehouse are still quoted at 2.60c., New York.

Cast-Iron Pipe.—Worcester, Mass., opens bids to-day on 747 tons of 4 to 20 in. Lowest bids on recent municipal lettings have been as follows: Standard Cast Iron Pipe & Foundry Company, $30 per net ton, delivered, on 565 tons of 6 to 12 in., Northampton, Mass.; R. D. Wood & Co., $29.34 on 495 tons of 12 to 24 in., Brookline, Mass.; Donaldson Iron Company, $33.10 for 4-in. and $30.10 for 6-in. and larger, in all 164 tons, Lawrence, Mass.; Standard Cast Iron Pipe & Foundry Company, $32.45 for 4-in. and $29.45 for 6 to 12 in., in all 680 tons, Lynn, Mass.; Donaldson Iron Company, $31.60 for 6-in. and $30.30 for 8 and 12 in., in all 233 tons, Revere, Mass. Punta Arenas, Chile, South America, is inquiring for prices on 456 tons of 3, 4 and 8 in., asking for alternate bids on bell and spigot and on flange pipe. Export inquiries have been quite numerous of late but pipe founders in this vicinity report that as far as they can ascertain no actual business has developed from this source. Private buying continues in good volume but municipal lettings are fewer than had been expected. Prices are higher. Carload lots of 6-in., class B and heavier are quoted at $29.50 per net ton tidewater, class A and gas pipe taking an extra of $1 per ton.

Old Material.—Railroad embargoes are greatly hampering the regular conduct of business in old material. It is difficult to make deliveries on old contracts, and dealers are obliged to be careful in entering new ones, fearing that they may be unable to get ship-

ments to the buyer within the time agreed upon. This situation has not affected the price of heavy melting steel scrap, which continues firm, but rolling-mill grades are inclined to weakness, although not quotably changed. As local machine shops are now producers of large quantities of mixed borings and turnings, quotations are being given below on this class of old material. Brokers are paying about as follows to local dealers and producers, per gross ton, New York:

No. 1 heavy melting steel scrap	$14.00 to $14.50
Relaying rails	23.50
Rerolling rails	15.00 to 15.50
Iron car axles	25.00 to 25.50
Steel car axles	24.00 to 24.50
No. 1 railroad wrought	20.00 to 20.50
Wrought-iron track scrap	17.50 to 18.00
No. 1 yard wrought, long	15.50 to 16.00
No. 1 yard wrought, short	14.00 to 14.50
Light iron	6.50 to 6.75
Cast borings	8.50 to 9.00
Wrought turnings	7.50 to 8.00
Mixed borings and turnings	6.50 to 6.75
Wrought pipe	13.25 to 13.50
Old carwheels	14.00 to 14.50
Malleable cast (railroad)	12.50 to 13.00

Foundries continue to be good buyers of cast scrap, which is not in plentiful supply, so that prices are firm. Dealers' quotations to consumers of cast scrap are as follows, per gross ton, New York:

No. 1 cast (machinery)	$17.00 to $17.50
No. 2 cast (heavy)	16.00 to 16.50
Stove plate	12.00 to 12.50
Locomotive grate bars	12.00 to 12.50

British Market Strong

Record Export Prices for Steel Bars—American Billets Selling Lower

LONDON ENGLAND, Feb. 9, 1916.

(*By Cable*)

Cleveland pig-iron warrants are strong, with the domestic demand eager. Export business in hematite iron is checked owing to makers having practically no iron available before the end of June; small lots are realizing 140s. minimum.

American 4-in. open-hearth billets have sold for £10 10s. c.i.f. Liverpool for April-June delivery. (This is a lower price than that reported a week ago.) Tin plates are steady at 25s. 6d., with a fair amount booked for Russia and Japan, but export business is hampered by shipping difficulties. For steel bars for export £13 have been offered. Prices of a few commodities are as follows:

Tin plates, coke, 14 x 20, 112 sheets, 108 lb. f.o.b. Wales, 25s. 6d.

Cleveland pig-iron warrants, 92s. 5d., as compared with 85s. 4½d., last week.

No. 3 Cleveland pig iron, maker's price, f.o.b. Middlesbrough, 76s. 9d.

Steel black sheets, No. 28, export, f.o.b. Liverpool, £19.

Steel rails, export, f.o.b. works port, £11 5s. nominal.

Hematite pig iron, f.o.b. Tees, about 135s.

Ferromanganese, f.o.b., £25, loose.

Ferrosilicon, 50 per cent, c.i.f., £27.

The Serious Shipping Situation—Details of Maximum Prices

LONDON, ENGLAND, Jan. 25, 1916.—It is becoming more and more evident that the dominating factor in the iron and steel situation is the transportation difficulty. Freight rates are mounting to the skies and shipowners are said to be actually "ashamed" at the prices they are being paid. They can easily find means for avoiding blushes, but the truth is that blundering in high quarters is assisting the wholesale exploitation of the country and the shipowning fraternity are really having the time of their lives. How such a position can be remedied is the question that is puzzling everybody.

At a moderate computation, what with German and Austrian vessels held up in neutral and home ports, Russian vessels immobilized in the Baltic and Black seas, and vessels of the entente powers sunk or destroyed, there is a diminution in the world's available tonnage of at least 30 per cent. Add to this the enormous amount of tonnage utilized exclusively for war purposes by the various governments, and it will be seen that there must inevitably be keen competition for any space left for the free market. Our home authorities, who have already plunged headlong into many a breach where angels would fear to tread, are now, as usual, "too late" talking about remedies. The labor question, too, is getting intolerable. It is impossible to get vessels discharged at some ports without weeks of delay. At some Welsh ports the services of women have actually been used in several instances to discharge ore.

FOUNDRY IRON HIGHEST IN FORTY YEARS

The demand for foundry iron is keener than ever. At 81s. 6d., asked by sellers for Cleveland warrants, the price has reached a level not attained for over 40 years, and there is no certainty that the highwater mark has been attained. Stocks have practically disappeared and the only available source is what is lying in the public stores, which supplies are already heavily depleted. Hematite is firm at 135s. for East Coast.

Finished iron crown bars, of North Staffordshire makes, are held for £14, while apparently the lowest quotation to-day for common iron is £13 10s.

The regulation of steel prices has made a step in advance. Originally when the question was mooted the Government fixed the price of Welsh bars at £10 7s. 6d., based on Welsh hematite at £6 2s. 6d. Both prices were at once seen to be low by all practical men and the many representations made to the Government to this effect have now induced it to reconsider the matter, and possibly £11 may be fixed for bars, based on hematite at £7. No Welsh steel makers would look at anything below £11 15s. to £12 to-day; indeed, they can sell their output and more at the former figure.

The same applies also to finished steel. Here prices have been fixed at £12 10s. for boiler plates, £11 10s. for ship and bridge plates and £11 2s. 6d. for joists and angles for the home trade. Needless to remark, there are buyers at far above these figures, and no sellers anywhere near. The position is farcical! The market for English billets is possibly a little easier, the price having fallen from the £13 quite recently quoted, but everything is at sixes and sevens. Foreign billets are practically unobtainable.

MAXIMUM PRICES FOR TUNGSTEN STEELS

Not satisfied with fixing prices for semi-finished and finished steel, high-speed material has now been tinkered with. The following prices have been fixed in this connection for the home trade:

Ordinary quality, approximately 14 per cent tungsten, 2s. 10d. per lb. (based upon ore at 55s.—a unit of tungsten); superior quality, approximately 18 per cent tungsten, 3s. 10d. per lb. (basis) net cash, delivered at the customers' works, with the following extras: Rounds and squares, 3 in. to 8 in. inclusive, 4d. per lb.; ditto, under ½ in. to ¼ in., 3d. per lb.; flats under 1 in. x ⅜ in. to ½ in. x ¼ in., and of sizes over four times in width over thickness, 3d. per lb.; bevels of approved sizes and sections, 6d. per lb.; bars cut to length, 10 per cent extra; exceptional sizes and sections, not covered in the above list, subject to special quotation; oddment orders of less than 56 lb., of a size, 3d. per lb. extra.

In the steel works the pressure generally is tremendous and, owing to the uncertainty about permission to deliver, and the utter confusion as to prices, many works are inclined to withdraw quotations altogether for the present. Every energy is being devoted exclusively to shell requirements, and practically the only business passing is in shell discards.

Practically every iron and steel manufacturing company in Pennsylvania has been invited to send a representative to a conference before the State Department of Labor and Industry at Harrisburg, Feb. 17, when occupational diseases, accident prevention and safety methods will be discussed. The State Industrial Board recently announced a safety code for foundries and is now working on standards for several other industries.

Finished Iron and Steel f.o.b. Pittsburgh

Freight rates from Pittsburgh in carloads, per 100 lb.: New York, 16.9c.; Philadelphia, 15.9c.; Boston, 18.9c.; Buffalo, 11.6c.; Cleveland, 10.5c.; Cincinnati, 15.8c.; Indianapolis, 17.9c.; Chicago, 18.9c.; St. Louis, 23.6c.; Kansas City, 43.6c.; Omaha, 43.6c.; St. Paul, 32.9c.; Denver, 68.6c.; New Orleans, 30c.; Birmingham, Ala., 45c.; Pacific coast, 73.9c. on plates, structural shapes and sheets and 65c. on wrought pipe and boiler tubes. The foregoing rates to the Pacific coast are by rail. The rate via New York and the Panama Canal is 56.9c.

Structural Material—I-beams, 3 to 15 in.; channels, 3 to 15 in.; angles, 3 to 6 in. on one or both legs, ¼ in. thick and over, and zees 3 in. and over, 2c. to 2.25c. Extras on other shapes and sizes are as follows:

	Cents per lb.
I-beams over 15 in.	.10
H-beams over 18 in.	.10
Angles over 6 in., on one or both legs	.10
Angles, 3 in. on one or both legs less than ¼ in. thick, as per steel bar card, Sept. 1, 1909	.70
Tees, structural sizes (except elevator, handrail, car truck and conductor rail)	.05
Channels and tees, under 3 in. wide, as per steel bar card, Sept. 1, 1909	.20 to .80
Deck beams and bulb angles	.30
Handrail tees	.75
Cutting to lengths, under 3 ft. to 2 ft. inclusive	.25
Cutting to lengths, under 2 ft. to 1 ft. inclusive	.50
Cutting to lengths, under 1 ft.	1.55

No charge for cutting to lengths 3 ft. and over.

Plates.—Tank plates, ¼ in. thick, 6¼ in. up to 100 in. wide, 2.10c. to 2.50c., base, net cash, thirty days. Following are stipulations prescribed by manufacturers:

Rectangular plates, tank steel or conforming to manufacturers' standard specifications for structural steel dated Feb. 6, 1903, or equivalent, ¼ in. and over on thinnest edge, 100 in. wide and under, down to but not including 6 in. wide, are base.

Plates up to 72 in. wide, inclusive, ordered 10.2 lb. per sq. ft., are considered ¼-in. plates. Plates over 72 in. wide must be ordered ¼ in. thick on edge or not less than 11 lb. per sq. ft., to take base price. Plates over 72 in. wide ordered less than 11 lb. per sq. ft. down to the weight of 3/16 in. take the price of 3/16 in.

Allowable overweight, whether plates are ordered to gage or weight to be governed by the standard specifications of the Association of American Steel Manufacturers.

Extras	Cents per lb.
Gages under ¼ in. to and including 3/16 in.	.10
Gages under 3/16 in. to and including No. 8	.15
Gages under No. 8 to and including No. 9	.25
Gages under No. 9 to and including No. 10	.30
Gages under No. 10 to and including No. 12	.40
Sketches (including straight taper plates), 3 ft. and over	.10
Complete circles, 3 ft. in diameter and over	.20
Boiler and flange steel	.10
"A. B. M. A." and ordinary firebox steel	.20
Still bottom steel	.30
Marine steel	.40
Locomotive firebox steel	.50
Widths over 100 in. up to 110 in., inclusive	.05
Widths over 110 in. up to 115 in., inclusive	.10
Widths over 115 in. up to 120 in., inclusive	.15
Widths over 120 in. up to 125 in., inclusive	.25
Widths over 125 in. up to 130 in., inclusive	.50
Widths over 130 in.	1.00
Cutting to lengths under 3 ft. to 2 ft., inclusive	.25
Cutting to lengths under 2 ft. to 1 ft., inclusive	.50
Cuting to lengths under 1 ft.	1.55

No charge for cutting rectangular plates to lengths 3 ft. and over.

Wire Rods.—Bessemer, open-hearth and chain rods, $47 to $50, nominally.

Wire Products.—Prices to jobbers, effective Jan. 24: Fence wire, Nos. 0 to 9, per 100 lb., terms 60 days or 2 per cent discount in 10 days, carload lots, annealed, $2.05; galvanized, $2.75. Galvanized barb wire and staples, $3.05; painted, $2.35. Wire nails, $2.20. Galvanized nails, 1 in. and longer, $2 advance over base price; shorter than 1 in. $2.50 advance over base price. Woven wire fencing, 64½ per cent off list for carloads, 63½ off for 1000-rod lots, 62½ off for less than 1000-rod lots.

The following table gives the price per 100 lb. to retail merchants on fence wire in less than carloads, with the extras added to the base price:

Plain Wire, per 100 lb.

Nos.	0 to 9	10	11	12&12½	13	14	15	16
Annealed	$2.10	$2.15	$2.20	$2.25	$2.40	$2.50	$2.60	$2.70
Galvanized	3.00	3.05	3.10	3.15	3.20	3.35	3.70	3.80

Wrought Pipe.—The following are the jobbers' carload discounts on the Pittsburgh basing card in effect from Jan. 20, 1916, on iron and steel black and galvanized pipe, all full weight:

Butt Weld

Steel: Inches	Black	Galv.	Iron: Inches	Black	Galv.
⅛, ¼ and ⅜	69	42½	¼ and ⅜	58	32
½	72	56½	½	59	33
¾ to 3	76	60½	⅝	59	33
			½	63	43
			¾ to 1½	66	48
			2	65	47
Lap Weld					
2	72	57½	1¼	50	32
2½ to 6	75	59½	1½	61	43
7 to 12	71	54½	2	62	45
13 and 14	60½	..	2½ to 4	64	48
15	58	..	4½ to 6	64	48
			7 to 12	62	46
Reamed and Drifted					
1 to 3, butt	74	58½	1 to 1½, butt	64	46
2, lap	71	55½	2, butt	63	45
2½ to 6, lap	73	57½	1½, lap	48	30
			1½, lap	59	41
			2, lap	60	43
			2½ to 4, lap	62	46
Butt Weld, extra strong, plain ends					
⅛, ¼ and ⅜	65	48½	⅜	57	40
½	70	57½	½	62	48
¾ to 1½	74	61½	¾ to 1½	66	50
2 to 3	75	62½	2 and 2½	66	50
Lap Weld, extra strong, plain ends					
2	71	56½	1½	60	44
2½ to 4	73	58½	2	63	46
4½ to 6	72	57½	2½ to 4	65	49
7 to 8	67	50½	4½ to 6	64	48
9 to 12	62	45½	7 to 8	57	41
			9 to 12	52	36
Butt Weld, double extra strong, plain ends					
½	61	48½	½	52	37
¾ to 1½	64	51½	¾ to 1½	55	40
2 to 2½	66	53½	2 and 2½	56	41
Lap Weld, double extra strong, plain ends					
2	62	49½	2	53	37
2½ to 4	64	51½	2½ to 4	55	42
4½ to 6	63	50½	4½ to 6	53	40
7 to 8	57	40½	7 to 8	46	30

To the large jobbing trade an additional 5 per cent is allowed over the above discounts.

The above discounts are subject to the usual variation in weight of 5 per cent. Prices for less than carloads are two (2) points lower basing (higher price) than the above discounts on black and three (3) points on galvanized.

Sheets.—Makers' prices for mill shipment on sheets, of U. S. standard gage, in carload and larger lots, on which jobbers charge the usual advance for small lots from store, are as follows, f.o.b. Pittsburgh, terms 30 days net, or 2 per cent cash discount in 10 days from date of invoice:

Blue Annealed Sheets

	Cents per lb.
Nos. 3 to 8	2.50 to 2.60
Nos. 9 to 10	2.65 to 2.75
Nos. 11 and 12	2.65 to 2.75
Nos. 13 and 14	2.65 to 2.75
Nos. 15 and 16	2.75 to 2.85

Box Annealed Sheets, Cold Rolled

Nos. 10 and 11	2.25
No. 12	2.25
Nos. 13 and 14	2.30
Nos. 15 and 16	2.35
Nos. 17 to 21	2.40
Nos. 22 and 24	2.45
Nos. 25 and 26	2.50
No. 27	2.55
No. 28	2.60
No. 29	2.65
No. 30	2.75

Galvanized Sheets of Black Sheet Gage

Nos. 10 and 11	3.75 to 4.00
No. 12	3.85 to 4.10
Nos. 13 and 14	3.85 to 4.10
Nos. 15 and 16	3.95 to 4.20
Nos. 17 to 21	4.10 to 4.35
Nos. 22 and 24	4.30 to 4.55
Nos. 25 and 26	4.45 to 4.70
No. 27	4.60 to 4.85
No. 28	4.75 to 5.00
No. 29	4.90 to 5.15

Boiler Tubes.—Discounts on less than carloads, f.o.b. Pittsburgh, freight to destination added, on lap-welded steel tubes, in effect from Jan. 14, 1916, and standard charcoal-iron tubes, effective from Jan. 20, 1916, are as follows:

Lap Welded Steel		*Standard Charcoal Iron*	
1½ in.	43	1½ in.	38 to 39
1¾ and 2 in.	55	1¾ and 2 in.	42 to 43
2¼ in.	52	2¼ in.	39 to 40
2½ and 2¾ in.	58	2½ and 2¾ in.	46 to 47
3 and 3¼ in.	63	3 and 3½ in.	50 to 51
3½ to 4½ in.	64	3½ to 4½ in.	52 to 53
5 and 6 in.	57	5 and 6 in.	46 to 47
7 to 13 in.	54		

Locomotive and steamship special charcoal grades bring higher prices.

1¾ in., over 18 ft., and not exceeding 22 ft., 10 per cent net extra.

2 in. and larger, over 22 ft., 10 per cent net extra.

Metal Markets

The Week's Prices

Cents Per Pound for Early Delivery

Feb.	Lake	Copper Electrolytic	Tin, New York	Lead—New York	Lead—St. Louis	Spelter—New York	Spelter—St. Louis
2	25.50	25.37½	41.25	6.10	6.00	18.50	18.25
3	26.00	25.87½	41.12½	6.10	6.00	18.62½	18.37½
4	26.00	25.87½	41.62½	6.10	6.00	18.87½	18.62½
5	26.00	25.87½	41.50	6.10	6.00	19.00	18.75
7	26.50	26.37½	41.50	6.10	6.00	19.25	19.00
8	26.50	26.37½	41.12½	6.10	6.00	19.25	19.00

NEW YORK, Feb. 9, 1916.

Spot and nearby copper is so scarce as to be practically unobtainable except at prices which are fast approachnng 30c. Tin has been quiet except on one or two days and is lower. Should a heavier demand develop for lead, its situation would approximate that in copper, and as matters stand an advance is expected. Spelter has been rather more than fairly active and is higher. Prompt antimony is scarce and the quotation has advanced.

New York

Copper.—The real market in copper to-day concerns deliveries in May, June and beyond in electrolytic and later in the case of Lake. Anything prior to May, and even metal for delivery in that month is rapidly becoming scarce, is dealt with as a specialty and commands premium prices. May and June electrolytic was quoted yesterday at 26.50c., full terms, or 26.37½c., 30 days, delivered, but February and March deliveries have sold at 27.50c. and a few spot carloads at 28c. Lake, forward delivery, is held at 26.50c. cash. The consumption of the metal is such as to astonish even old timers in the metal business. The heaviest industrial consumption has been completely outclassed by the manner in which copper is being absorbed by the war demand. In fact, the refineries cannot get it out fast enough. Price advances have not checked the buying, which was exceptionally heavy at 26c., full terms, and slightly less. France has again taken a great deal of copper. The exports of this month, including yesterday, total 5873 tons. The export figures from this time on are expected to show a great increase in war munitions containing copper. The London price for electrolytic continues to advance and was quoted yesterday at £131, against £129 on the preceding day.

Tin.—In the latter part of last week the market was dull and heavy, with business confined to small lots of prompt and nearby deliveries. On Monday of this week there was a good business in tin soon to arrive, probably 300 tons being traded in. For some days practically no interest has been shown in futures and business was confined to a few consumers. The January deliveries, 4452 tons, compare with 2480 tons in the same month of 1915. The total visible supply Jan. 31 was 17,041 tons, against 13,901 tons Jan. 31, 1915. The arrivals this month, including yesterday, total 2455 tons and there is afloat 5870 tons. The spot quotation yesterday was 41.12½c.

Spelter.—Under a demand which is described as fair to good the quotations for prime Western have advanced from day to day, and yesterday were about 19.25c., New York, and 19c., St. Louis, for prompt delivery. February was quoted at 18.75c., St. Louis; March at 18.50c., St. Louis, and April, May and June at 16.50c., St. Louis. Prompt spelter continues scarce. Severe floods in the Joplin district are interfering seriously with the production of ore and this has already imparted some strength to the market.

Lead.—Lead was exceedingly strong yesterday at 6.10c., New York, and 6c., St. Louis. Throughout the week sellers have not been pushing to make sales and some of the independents have obtained premiums from those consumers who were forced into the market, also where the metal was sold for export. Contradictory reports are heard with regard to the foreign demand, but it is unquestionably good, even if not as heavy as it was a few weeks ago. A London letter intimates that greater strength may be expected and attributes the strong London market in part to the cutting off of German supplies, which have not yet been replaced by deliveries from other sources. A New York authority says that if any considerable additonal demand develops it is very questionable where metal can be found to care for it. The exports of this month, including yesterday, total 1751 tons.

Antimony.—The scarcity of prompt antimony makes it strong at 43.50c. to 45c., duty paid. The demand is good. Shipments from Shanghai, China, this month, due about the middle of March, are quoted at 32.50c. in bond.

Aluminum.—The market for virgin aluminum, 98 to 99 per cent pure, is stronger at 54c. to 56c. A large plant working aluminum in Wisconsin was forced to shut down for a few days last week for lack of raw material.

Old Metals.—The market continues very strong, with prices advancing so rapidly that quotations are uncertain. Dealers' selling prices are about as follows:

	Cents per lb.
Copper, heavy and crucible	23.00 to 24.00
Copper, heavy and wire	22.00 to 23.00
Copper, light and bottoms	19.00 to 20.00
Brass, heavy	14.50 to 15.00
Brass, light	12.00 to 12.50
Heavy machine composition	17.50 to 18.00
No. 1 yellow rod brass turnings	15.00 to 15.50
No. 1 red brass or composition turnings	16.00 to 17.00
Lead, heavy	5.75
Lead, tea	5.25
Zinc	13.00 to 14.00

Chicago

FEB. 8.—The market for copper is growing stronger, and with higher prices throughout the week is last quoted as high as 28c. for Lake. With respect to other metals, the market remains steady. We quote: Casting copper, 26c.; Lake copper, 27 to 28c.; tin, carloads, 42c.; and small lots, 44c.; lead, 6.051½c.; spelter, 18.75c.; sheet zinc, 24c.; Cookson's antimony, 50c.; other grades, 46c. On old metals we quote buying prices for less than carload lots as follows: Copper wire, crucible shapes, 19.50c.; copper bottoms, 18.75c.; copper clips, 19.50c.; red brass, 17.75c.; yellow brass, 15.75c.; lead pipe, 5c.; zinc, 13.75c.; pewter, No. 1, 26c.; tinfoil, 34c.; block tin pipe, 38c.

St. Louis

FEB. 7.—Prices are firm as follows: Lead, 6.25c.; spelter, 19.50c.; tin, 45c.; Lake copper, 26.50c.; electrolytic copper, 26.25c.; antimony, Asiatic, 45c. In the Joplin ore market there was decided firmness and one notable feature of the week was the largest individual sale in the history of the camp, it being the transfer of 1000 tons of zinc blende at a base price of $117.50, which, with the premium on settlement, brought the total cash payment up to $121,000. The range of prices for zinc blende, 60 per cent, was $100 to $117.50 per ton, with the choicest grades as high as $121. Calamine was sold on a range of $55 to $75, and lead ore at $82. The average price of the week's production of the entire camp was: Zinc blende, $110; calamine, $61; lead, $78. Miscellaneous scrap metals are quoted as follows: Light brass, 8.50c.; heavy yellow brass, 10.50c.; heavy red brass and light copper, 11.50c.; heavy copper and copper wire, 14c.; pewter, 24c.; tinfoil, 32c.; lead, 4c.; zinc, 8.50c.; tea lead, 3.50c.

Organization for the ensuing year was made by the Dayton Recording & Computing Machines Company, Dayton, Ohio, at a meeting of the directors and stockholders held Feb. 1. The following officers were elected: President, Will I. Ohmer; vice-president, H. A. Toulmin; secretary, Frank E. Pierson; treasurer, A. D. Shellabarger; manager of works, C. U. Carpenter. The directors are Will I. Ohmer, Oscar M. Gottschall, John Kirby, Jr., C. B. W. Dunn, J. P. Murphy and N. Curry. Reports of officers showed the company to be in excellent condition and employing about 3000 men and women. It is expected to increase this number by March 1 to approximately 5000.

Iron and Industrial Stocks

NEW YORK, Feb. 9, 1916.

While railroad and miscellaneous stocks have been affected from day to day by the varying news regarding our relations with Germany, the iron and steel stocks and related securities have quite steadily advanced, in some stocks the advance having been heavy. Lackawanna Steel sold off with the announcement that the proposed consolidation of this company with others had been dropped, but a sharp upward movement took place in Cambria Steel when the fact was divulged that it had been acquired by the Midvale. Stocks of all the car equipment companies sought higher levels, notably Baldwin Locomotive. Canadian Car & Foundry scored a notable advance. The range of prices on active iron and industrial stocks from Wednesday of last week to Tuesday of this week was as follows:

Allis-Chal., com.	27 - 33	Pipe, pref.	48½ - 50
Allis-Chal., pref.	79 - 82½	U. S. Steel, com.	81½ - 84⅜
Am. Can, com.	61⅜ - 63¼	U. S. Steel, pref.	115⅜ - 117
Am. Can, pref.	110 - 111¾	Va. I. C. & Coke.	53 - 57½
Am. Car & Fdy., com.	66 - 70⅞	Westg. Electric.	65¼ - 68⅝
		Am. Rad., com.	397½
Am. Car & Fdy., pref.	117⅜ - 117½	Am. Rad., pref.	136 - 136¾
		Am. Ship, com.	34 - 39
Am. Loco., com.	65 - 68½	Am. Ship, pref.	80½ - 82
Am. Loco., pref.	102 - 102⅞	Chic. Pneu. Tool.	72 - 75
Am. Steel Fdries.	53 - 56⅝	Cambria Steel.	72⅝ - 80¼
Bald. Loco., com.	109 - 118½	Lake Sup. Corp.	9⅜ - 10⅛
Bald. Loco., pref.	108 - 109	Pa. Steel, com.	60 - 61
Beth. Steel, com.	465 - 475	Pa. Steel, pref.	79¾ - 86
Case (J.I.), pref.	87	Warwick	10¼ - 10¼
Colorado Fuel.	43½ - 48⅞	Cruc. Steel, com.	74½ - 86½
General Elec.	169 - 173¼	Cruc. Steel, pref.	112 - 118½
Gt. No. Ore Cert.	43⅞ - 47⅝	Harb.-Walk. Refrac., com.	81 - 83½
Int. Harv. of N. J., com.	110⅜ - 111	Harb.-Walk. Refrac., pref.	101
Int. Harv. of N. J., pref.	119	La Belle Iron, com.	50 - 50⅝
Lacka. Steel.	75¾ - 84	La Belle Iron, pref.	123½
Nat. En. & Stm., com.	23⅞ - 26¾	Can. Car & Fdy., com.	64 - 77
Nat. En. & Stm., pref.	94 - 96½	Can. Car & Fdy., pref.	75 - 90
N. Y. Air Brake.	142 - 148	Carbon Stl., com.	55 - 68
Pgh. Steel, pref.	95½	Carbon Steel, 1st pref.	80
Pressed Stl., com.	55 - 58	Carbon Steel, 2nd pref.	59
Ry. Steel Spring, com.	38⅛ - 40½	Driggs-Seabury	141 - 146
Republic, com.	51 - 54	Midvale Steel.	64⅞ - 73⅞
Republic, pref.	108 - 110½		
Sloss, com.	57⅜ - 61		
Sloss, pref.	97		
Pipe, com.	17⅝ - 20		

Dividends

The Griffin Carwheel Company, regular annual, 6 per cent on the common stock, payable 3 per cent March 1 and 3 per cent Sept. 1, also an extra of 1 per cent on the common, payable March 1.

The American Smelting & Refining Company, regular quarterly, 1¾ per cent on the preferred stock, payable March 1, and 1 per cent on the common stock, payable March 15.

The Crocker-Wheeler Company, extra, 2 per cent on the common stock, payable March 1.

Record Output of Spelter in 1915

The spelter production of the United States in 1915 was 492,495 tons from ore smelters, according to the *Engineering and Mining Journal*. This is the largest ever recorded. When the output from dross and scrap smelters is added, the total will approximate 500,000 tons. The listed smelters had 155,000 retorts active on Dec. 31. At 4.2 tons of spelter per year to each retort the rate then was 650,000 tons. Besides these, 23,234 retorts were building, corresponding to an output of 97,500 tons per year. Further, the Trail production of electrolytic spelter at about 12,000 tons per year was scheduled to begin in January, with a production of about 35,000 tons per year by the Anaconda Copper Company to begin in the summer. The total production in prospect is therefore 794,000 tons per year, with 800,000 tons as a possible total.

President Louis Birkenstein of the National Association of Waste Material Dealers has called a meeting to organize a Western Division on Feb. 14 at 6.30 p. m. at the Sherman House, Chicago. Dinner will be served at the expense of those participating and important matters will then be taken up for discussion. At the last regular meeting of the association held in New York it was unanimously voted to form such a division.

The Eastern Blast Furnace Deal

The option on the stock of the Thomas Iron Company, Easton, Pa., taken by the Kachelmacher and Danforth interests late in 1915, expires Feb. 11. The option taken on the stock of the Empire Steel & Iron Company expires Feb. 14. No positive intimation has been given that these options will be exercised, but indications are that the project will not be put through on the lines originally suggested. An Eastern steel maker, who disposed of his plant a few months ago, has been spoken of as a possible factor in the proposed consolidation or in some similar project having the building of a steel plant as one of its features.

The interests which have the Thomas and Empire options exercised an option about a month ago on the Wharton Steel Company properties in New Jersey on a $1,500,000 basis. Under the terms of this option 30 days more may elapse before the properties are transferred.

Large Buying of Locomotives

Orders for more than 120 and inquiries for more than 275 locomotives are reported in the last two weeks. The Baldwin Locomotive Works will build 80 small locomotives for the French Government similar to those ordered last year and the American Locomotive Company will furnish the Southern Pacific with 20 locomotives, numerous small orders making up the remainder. The New York Central is inquiring for 150, the Chicago & Northwestern for 35, the National Railways of Mexico for 50, the Bessemer & Lake Erie for 20 and the Erie for 15 locomotives. The New York, New Haven & Hartford is also said to be in the market. Total orders for January, 1916, are estimated at 353, of which 85 were for export. Orders in 1915 were at the rate of 164 per month.

A commercial war between Germany and the Scandinavian nations is said to be imminent, due to Germany's attempt to raise the value of the mark and improve the German balance of trade. This is to be done by enforcing practically a monopoly of the import trade of Scandinavian goods into Germany in the hands of a very limited number of firms, thus eliminating competition and forcing prices to the lowest possible figure. The German Government rules that all contracts for exports of iron castings to Sweden must be abrogated unless an increase of 60 per cent in price, payable in Swedish money, is met. The British embargo has given Germany a monopoly of this work. Prohibition of iron ore exports and discriminating tariff duties are urged by Swedish business interests in reprisal.

At the annual meeting of the Reading Iron Company, held Feb. 8 at its offices in Reading, Pa., directors were elected as follows: F. C. Smink, E. T. Stotesbury, Samuel R. Seyfert, Heber L. Smith and Jefferson Snyder. The board of directors then convened and elected these officers: Chairman, E. T. Stotesbury, Philadelphia; president, F. C. Smink, Reading; vice-president and general manager, George Schuhmann; secretary, George W. Delaney; treasurer, Henry N. Yost.

A serious shortage of copper sulphate and sublimed sulphur is reported in Spain by U. S. Consul P. H. Foster at Jerez de la Frontera. The copper sulphate shortage amounts to 4000 to 7000 metric tons. The total exports of copper sulphate from the United States to Nov. 1, 1915, were 10,300,131 lb., against 3,845,555 lb. to Nov. 1, 1913.

The Benzol Products Company at Marcus Hook, Pa., near Chester, is to build a research laboratory at a cost of $15,000, as well as other buildings to be used in the manufacture of additional products used in the dye industry. The total expenditure for improvements will be $45,000.

The General Smelting Company has removed its offices to the Stock Exchange Building, Broad and Walnut streets, Philadelphia, Pa.

OBITUARY

THOMAS HENRY O'CONNOR, who died at his home in New York City Feb. 5, at the age of 88 years, was among those who went to California on the discovery of gold in 1849. With his brothers, Michael J. and John F., and his cousin, James Conroy, he founded the steel and hardware house of Conroy & O'Connor, now the Dunham, Carrigan & Hayden Company, San Francisco. He was born in New York and started as a clerk with Naylor & Co., whose main office was then in London, England, in their New York office. In 1864 he moved back to New York. He was at the time of his death a trustee of the Emigrant Industrial Savings Bank. He leaves four sons and three daughters.

THOMAS J. MOORE, manager for the Halcomb Steel Company, with offices at 633 Arch Street, Philadelphia, died Feb. 6 at Atlantic City after an illness of several months, aged 57 years. He was graduated from Dublin (Ireland) University, and was a member of the Rotary Club, Manufacturers' Club and Pen and Pencil Club, of Philadelphia, and the Travelers' Association. He leaves his widow, two sons and a daughter.

FRANK SNYDER, who had been general superintendent of the Mount Vernon Car Mfg. Company since its organization 26 years ago, died Feb. 2 at his home in Mount Vernon, Ill., following an illness of but ten days.

THOMAS B. HARKINS, president T. B. Harkins Foundry Company, Bristol, Pa., died Feb. 1 from apoplexy. He established his foundry in 1870 and invented many devices used in molding.

HENRY INGMAN PARK, president and treasurer of the Flint & Walling Mfg. Company, Kendallville, Ind., died Jan. 23, aged 71 years.

ROBERT ALLISON, founder of the Franklin Iron Works, Port Carbon, Pa., died suddenly Feb. 3, aged 89 years.

Glasgow Plate Mill Leased

L. F. Nagle, formerly sales manager of the Worth Brothers Company, Coatesville, Pa., has leased the plate mill of the Glasgow Iron Company at Pottstown, Pa., and may start up the plant within a month. The terms of the lease call for one year with the privilege of renewal for three years and an option on the plant at the end of that time, if he desires it. The mill, which contains one 96-in. train, has been idle for twelve years. Just prior to that time it was burned. The plant was later rebuilt, but operations were not resumed. Three new furnaces, it is understood, are to be installed and the machinery overhauled. Mr. Nagle expects to incorporate a company within a short time under the name of the Nagle Steel Company. It was at this plant that Mr. Nagle entered the steel business as layer out and inspector. The negotiations between Mr. Nagle and Comly B. Shoemaker, president Glasgow Iron Company, for the lease of the plant were completed Feb. 1.

The J. Lipsitz Company, dealer in all grades of scrap iron, steel and metals, occupying a large yard and works at Third and Carter streets, Chelsea, Mass., on the Boston & Albany Railroad, has found it necessary to make extensive improvements and additions to take care of the rapid growth of its business. An order was placed recently with the Maine Electric Company, Portland, Me., for a 30-ton electric hoisting engine to operate a derrick in the yard, and additional equipment is to be installed immediately. Plans have been prepared for a building, 40 x 80 ft., to be erected in the spring, to house new offices, and it will be located on a large plot of land, just purchased, adjoining the yard. The company claims to have the largest and best equipped scrap yard in New England, having powerful shears, 100-ton railroad track scales, derricks, and a Browning locomotive crane, with lifting magnet, enabling the largest pieces of old material to be easily handled.

Over 1600 German Plants Making Shells

President Meyer, of the Association of German Iron and Steel Manufacturers, at a recent general meeting said that if the German iron and steel industry had not been sound and strong and capable of producing more than was needed by the home market it could not have met the enormously increased strain of the war and that Germany, being unable to fall back for her requirements on the United States, could not have held out. Dr. Reichert, director of the export department of the association, in giving a report on its work during the war said:

In the first months of the war the German raw steel output fell to little more than one-third of the normal peace output, but in March, 1915, it again exceeded the 1,000,000 ton mark, and in October amounted to 1,215,000 tons, or 77 per cent of the average peace output. This demonstration of the powers of the German steel industry in war time was the more gratifying because the British steel production reached high-water mark in 1910 with 6,500,000 tons, or only about one-half of the German war output. Practically all the existing German steel works, numbering 130, had taken up the manufacture of war material, and in the course of the war no fewer than 70 firms had built new steel plants. It would not be an exaggeration to say that, counting all the plants which are making shells, from 1600 to 1800 are now engaged in the production of munitions.

The maintenance of export business, the report said, is a matter of urgent necessity, both with an eye to the present and to future American competition. The American industries are strongly interested in the continuation of the war, as is apparent from the increase in the exports of iron and steel from the United States. In view of the threatening American competition after the restoration of peace, Germany must maintain her existing industrial trusts and even create new ones.

With regard to commercial policy after the war, the association, it was stated, is clear on the following points: The protective system of Germany, inaugurated by Bismarck, must be maintained; Germany must lay down the conditions upon which her goods are to be exported to the principal foreign markets; Germany must see that her products are placed upon an equal footing with those of other countries in foreign markets; where necessary German customs duties must be raised so as to render the country independent of foreign goods. It was decided to send a telegram to the Imperial Chancellor, stating that the members of the association are able to supply the armies of Germany and her allies with all necessary munitions and other war material for many years to come, and at the same time to supply whatever the home and neutral markets might need for ordinary trading purposes.

Safety First Exhibit in Washington

In Washington, D. C., the week of Feb. 21 to 26 inclusive, a "safety-first" exhibit will be held in which all of the Government departments will take an active part. This exhibit will have a national aspect, as manufacturers and operators from all over the country are invited to be present, that they may see what the Government of the United States is doing in "safety-first" work.

Secretary of the Interior Lane has sent a letter to the Governor of each State inviting him to send a delegate, and asking that the chief mine inspector, a representative of the industrial commission, or of other agencies engaged in compiling statistics relating to the various mineral industries, also attend this exhibition. It is hoped that all interested persons will visit the exhibit, and will attend the conference of State mine inspectors, which will be held at the office of the Bureau of Mines, Feb. 24.

In December the South works blast furnaces of the Illinois Steel Company produced the largest quantity of pig iron for any month in the history of the plant, namely, 180,109 tons. Making allowance for the stack blown out in the latter part of the month for relining, this production is at a daily average rate for the eleven furnaces of about 550 tons.

No. 3 blast furnace of the Thomas Iron Company at Hokendauqua, Pa., was blown in on foundry iron Monday, Feb. 7. The company is now operating four furnaces.

Business Convention in Washington

WASHINGTON, D. C., Feb. 8, 1916.—The fourth annual convention of the Chamber of Commerce of the United States met here to-day and will remain in session three days. Business problems of importance, many of which have developed the past year, will be discussed and reports will be received from committees which, for several months, have had under consideration questions of vital interest to the business community. A. W. Douglas, St. Louis, vice-president Simmons Hardware Company, chairman of the Committee on Statistics and Standards, will discuss a number of manufacturers' problems; Prof. Paul T. Cherington, Harvard University, will report on the "Maintenance of Resale Prices"; Daniel P. Morse, New York, will present a special report on the proposed "Non-Partisan Tariff Commission"; and William H. Douglas, an authority on foreign shipping, will report on the subject of the "American Merchant Marine" which is now engrossing so much attention. Other important reports will include the "Seamen's Act" and "The Need of a National Budget," by R. G. Rhett, Charleston, S. C.; "Labor Exchange," by Charles P. Neill, former Commissioner of Labor; "The Federal Trade Commission," by Harry A. Wheeler, Chicago; "Immigration," by Frank Trumbull, New York; "Foreign Relations," by Charles H. Sherrill, New York, formerly United States Minister to Argentina, and "Education," by Frederick A. Geier, Cincinnati.

The Boston Chamber of Commerce is preparing for a vigorous contest to secure the active aid of the National Chamber in its campaign for industrial efficiency in opposition to the efforts of organized labor to eliminate scientific shop management from Government institutions. It will present a strong resolution, the adoption of which by the National Chamber will be urged. In a memorial in support of the resolution the Boston Chamber reviews the passage by Congress last winter of the so-called Deitrick amendment prohibiting the use of the Taylor system in the arsenals, but which failed of its object because it was not incorporated in the fortifications bill under which a large part of the actual work of manufacturing munitions is carried on. Continuing, the memorial states that there is reason to believe that at this session of Congress a more determined and skillfully directed effort will be made to suppress any form of economic administration of Government workshops under whatever appropriations the work may be performed and to prohibit all forms of bonus, premiums, or piece-rate payments in those shops, "thus reducing them to the dead level of the old day-wage systems, with no lawful means of satisfactorily establishing or maintaining any standard of production." The belief is expressed that when the immediate plans regarding Government shops shall have been consummated "further effort will be made to extend similar prohibitions, in a far-reaching way, to establishments furnishing material or supplies to the Government, to the extent of even prohibiting altogether Government purchases from private plants unless completely operated in accordance with the terms of similar prohibitive special legislation." W. L. C.

Scrap Exports Increasing

Exports from the United States of scrap iron and steel are increasing each month, due to demands from Italy and other countries. The comparative Government figures show the following:

	Gross Tons	Gross Tons per Month
August, 1915	8,818	
September, 1915	10,290	12,278
October, 1915	17,715	
Ten months ended Oct. 31, 1915	58,098	5,809
Fiscal year ended June 30, 1915	29,820	2,486
Fiscal year ended June 30, 1913	102,201	8,516

In August, September and October these exports were at the rate of 147,336 tons per year, against record exports of 102,201 tons in the fiscal year 1913. Imports of scrap iron and steel were 40,435 tons to Nov. 1, 1915, which compare with 40,087 tons to Nov. 1, 1913, and 118,610 tons for the record fiscal year of 1910.

Trussed Concrete Steel Convention

The last week of January was a notable one for the Trussed Concrete Steel Company, as it marked the first annual convention of the branch managers, held at the main plant at Youngstown, Ohio. Not only was every section of the country represented, but also far distant regions, including Japan, Hawaii, South America and Porto Rico. Fully 100 were in attendance.

The general program included business sessions every morning and afternoon. President Julius Kahn gave the opening address Jan. 25, followed by an interesting talk on "Shop Practice" by T. H. Kane, manager of works. The noon recess was devoted to a thorough inspection of the manufacturing operations with a competent corps of guides to explain details. The subject of "Steel Sash" was ably handled by P. M. Louwerse, manager of the sash department. Many interesting points dealing with the manufacture of the various types of sash were brought out, as well as on design, systems of construction and local requirements regarding "Reinforced Concrete." R. D. Snodgrass, chief engineer, talked on "Engineering Practice"; B. J. Sigmund, Philadelphia manager, on "The Value of Engineering Service," and Hermann Fougner, New York manager, on "Experiences with Reinforced Concrete." The subject of Hy-Rib and Metal Lath yielded interesting papers, among which were "Metal Lath," by J. Earle Heber, former Los Angeles manager; "My Method with Distributors," by Louis Baum, Kansas City manager. "Concrete Pavements," with armor plates for protecting the joints, and "Kahn Mesh Reinforcement" occupied one of the morning sessions under the leadership of John Bowditch, manager of the highway department. O. W. Chaffee, manager of the credit department, spoke on "Credits and Collections." Discussions were so extended, rendering the business sessions so active, that it was found impracticable to cover the program which had been planned and a number of important discussions had to be postponed until another session. The convention closed Jan. 28 with a talk on general subjects by Gustave Kahn, general manager of sales.

A complete program was also planned for the entertainment of each evening. On the opening night special motion pictures of Oregon views were given by J. A. Currey, Portland manager, also an address on "History and Growth of the Company," by M. Goldenberg, Michigan manager, followed by a buffet luncheon. On Wednesday evening a banquet was given at the Hotel Ohio, at which special company songs were rendered. T. W. Murray, associate manager of sales, was toastmaster. The next evening was spent at a local theater, and after the performance a buffet luncheon was served in the grill room of the Hotel Ohio. All in attendance spoke enthusiastically of the value of the work done and the branch managers carried away many new ideas which would be helpful to their clients.

Austrian locomotive manufacturers are reported as unable to execute promptly the orders received from the government, because of lack of labor. A recent government order for 150 locomotives to be delivered in 1915 has been only partially filled, so that an additional order for 129 for delivery before July 1, 1916, is not to be negotiated unless the other order is filled at once.

The production of bituminous coal and anthracite in the United States in 1915 is estimated by C. E. Lesher of the U. S. Geological Survey at 518,000,000 net tons, an increase of less than 1 per cent over 1914. The bituminous coal output was 6,500,000 tons in excess of that of 1914, while the anthracite record was about 2,200,000 tons less.

A new zinc concentrator with a capacity of at least 2000 tons of ore per day is planned by the Anaconda Copper Company at the Washoe smelter, which it is hoped to have ready by July 1. Concentrates from this plant will be sent to the electrolytic zinc refinery now being built at Great Falls, Mont., and to be completed by Sept. 1.

Machinery Markets and News of the Works

MARKETS MORE SETTLED

Munitions Equipment Demand Lighter

Some Large Foreign Requirements Remain to Be Filled, but Export Sales Are Fewer—Domestic Needs Are Varied

The markets are unquestionably becoming more settled, with a conspicuous demand from new industrial plants and those which are extending their facilities. From one to a dozen tools are usually specified. No large war inquiries are reported, at least for domestic delivery, although foreign representatives have large lists against which they will eventually place orders.

A representative of a French firm has been quietly making inquiry in New York for about 1000 machine tools, all of which are specified. Some large Russian orders are pending in Cincinnati.

The demand for small tools, such as drills, reamers and milling cutters, is enormous, and large orders are being placed despite what would seem to be prohibitive prices. Certain high-speed drills regularly selling at $29 are now bringing $187. Single orders call for thousands of tools, and manufacturers are unable to supply the full demand.

The export demand is lighter in Cleveland, and inquiries for munitions equipment have slackened, but scattered orders for metal-working equipment needed for plant extensions are numerous. The Cleveland Automatic Machine Company is in the market for tools needed to increase its production. The Niles Forge & Mfg. Company, Niles, Ohio, is building a machine shop, 25 x 100 ft.

The East Iron & Machine Company, Lima, Ohio, has prepared plans for a building in which asphalt machinery will be manufactured.

The Sanitary Mfg. Company, Kenova, W. Va., is in the market for foundry equipment, woodworking machinery, hydraulic presses, heavy duty pumps, gas engines, dynamos, etc.

Cincinnati believes that the peak of the foreign buying is past, inasmuch as several large contracts for lathes and other machines will be completed March 1, and subsequent orders are not as large. Domestic demand, however, shows an improvement.

The Vandalia Railway has plans for the erection of a roundhouse and shop at Bicknell, Ind., to cost about $350,000. The Illinois Central Railroad will build a woodworking shop, roundhouse and other shop buildings at Louisville, Ky.

The Ogren Motor Works, Waukegan, Ill., has plans for a new factory, on which work will start in the spring, to cost about $150,000. The Stewart-Warner Speedometer Corporation will build a six-story concrete factory to cost $250,000.

It is reported that the Chevrolet Motor Company, Flint, Mich., will purchase a large amount of equipment. Large automobile plants are projected in Canada by the Chalmers Motor Car Company and the Maxwell Motor Company.

The Great Lakes Boat Building Corporation, Milwaukee, Wis., will take over the St. Louis Yacht & Boat Company, St. Louis, and the Milwaukee Yacht & Boat Company, Milwaukee, and consolidate operations at Milwaukee. The Fore River Shipbuilding Corporation, Quincy, Mass., is planning to further increase its capacity, and will immediately erect a three-story woodworking shop, 72 x 500 ft. The Union Iron Works, San Francisco, has recently placed orders for lathes and other tools.

The general demand for machine tools is steadily broadening on the Pacific coast, a direct result of the greater activity of metal working shops.

New York

NEW YORK, Feb. 9, 1916.

Inquiry continues to come out in good volume, but the market is gradually becoming more settled than it has been in recent months. Fewer large inquiries are appearing, probably for the reason that the war business has moved westward. It is not easy to close sales when intending purchasers learn of the far-off deliveries, although the purchasing agents of many of the larger concerns see the wisdom of getting their future requirements booked. Second-hand machines are scarcer than they have been at any time heretofore. Collections are not as good as they were a few weeks ago, but still are fair. They would be better were not so many firms behind in their deliveries, which halts their collections and, in turn, their payments to others.

The demand for lathes is lighter, but a good demand exists for grinders, both surface and cylindrical, milling machines, etc., most of which are wanted by companies having war orders.

A representative of a French company is in the city quietly making inquiry for over 1000 machine tools, practically all of which are specified.

The Glens Falls Forging & Welding Company, Glens Falls, N. Y., is inquiring for equipment for machining high-explosive shell nose pieces.

The Covert Motor Vehicle Company, Lockport, N. Y., which is enlarging its plant, is buying against a good list of tools.

The A. W. Wheaton Brass Works, Newark, N. J., is inquiring for machines for the manufacture of small parts which it has heretofore had made outside of its own shops.

The Midvale Steel Company, Nicetown, Philadelphia, has not yet closed its inquiry for twenty 5-ton cranes. Other good crane business is pending and the builders could easily take on a great many more orders at good prices if their deliveries permitted.

The Ajax Rubber Company, 1796 Broadway, New York, is erecting at its Trenton plant an additional building, 250 x 350 ft., three stories, of brick and steel, a new power house and an addition to the vulcanizing department. These additions will double the plant capacity. The existing boiler capacity will then be used wholly for steam vulcanizing. The present engine equipment will be held in reserve, the new power plant being used for regular operations.

The Universal Steel Cabinet Company, 2026 Pacific Street, Brooklyn, N. Y., has increased its capital stock from $30,000 to $60,000 to provide for the expansion of its business. William J. Tinsley is treasurer.

The Ganz-Air System, Inc., manufacturer of breathing apparatus for firemen, divers, etc., Poughkeepsie, N. Y., advises that it has no intention of building a factory at present, but will confine its work to assembling. John M. Ganzer is the proprietor.

The Linde Air Products Company, Forty-second Street Building, New York, has taken out a permit for the construction of a branch plant, 115 x 174 ft., two stories, to be erected at Stark, Walnut and Schuyler streets, Utica, N. Y.

at an estimated cost of $35,000. The R. Richards & Son Company is the contractor.

The Albany Perforated Wrapping Paper Company, Albany, N. Y., will begin at once the construction of a two-story brick and concrete factory, 200 x 300 ft., at Albany, N. Y., for the manufacture of toilet papers. The Samuel Austin & Son Company, Cleveland, Ohio, is the contractor. The plant will require from 400 to 500 men. Seth Wheeler is president and Seth Wheeler, Jr., is vice-president and general superintendent.

The F. N. Burt Company, manufacturer of boxes and cartons, Buffalo, has filed plans for the enlargement of its six-story factory at Niagara Street, Potomac Avenue and the New York Central Railroad.

The Eastern Grain, Mill & Elevator Corporation, Buffalo, has let contract to the Monarch Engineering Company for the erection of a 1,000,000-bu. concrete grain elevator on Buffalo River and the New York Central Railroad tracks. It will have facilities for unloading grain steamers, loading and unloading cars and loading canal boats simultaneously.

The American Body Company, Buffalo, manufacturer of automobile bodies, will erect a two-story brick and steel factory addition to its plant on Niagara Street.

The Danahy Packing Company, Buffalo, will enlarge its four-story brick and steel cold storage plant at Metcalfe and Clinton streets at a cost of $25,000.

The Clifton Mfg. Company, Buffalo, manufacturer of metal tubes and conduits, has taken out building permit for erection of a one-story steel and brick addition to its plant at Sayre Street and the New York Central Railroad.

The New York Car Wheel Company, Buffalo, Frederick B. Cooley, president, is enlarging its foundry plant at Forest Avenue and the New York Central Railroad.

The Ferguson Steel & Iron Company, Buffalo, is erecting an additional steel frame crane runway at its fabricating plant at Bailey Avenue and the New York Central Railroad.

The Maggard-Bradley Motion Picture Machine Company, Morehead, Ky., is considering removing its plant to Tonawanda, N. Y., and arranging for an increase in capacity.

New England

BOSTON, MASS., Feb. 7, 1916.

The Fore River Shipbuilding Corporation, Quincy, Mass., is planning to increase its capacity and will immediately begin the erection of a wood-working shop, 72 x 500 ft., three stories, as the first step in this plan.

The United States Torpedo Station, Jamestown, R. I., has completed its new factory and installed much of the machinery, but is running about 200 hands short as it has been unable to obtain machinists.

The Lindstrom Tool, Die & Gauge Company, Bridgeport, Conn., has been incorporated with authorized capital of $20,000, $5,000 paid in. The incorporators are F. L. Lindstrom, Ada Lindstrom and John J. Cass.

The National Welding Company, New Haven, Conn., has been incorporated with authorized capital of $10,000, $7,500 paid in. The incorporators are John F. Shuford, M. A. Spanutius and Joseph Kurzweil.

A strike, lasting a few days, of some of the wire-workers of George W. Prentiss & Co., Holyoke, Mass., has been settled on the basis of an advance in pay of 10 to 15 per cent and time and a half for overtime.

The Scovill Mfg. Company, Waterbury, Conn., on Feb. 3 placed in its employees' envelopes a statement expressing the desire of the company that its workmen share in its great prosperity. Each envelope contained a bonus of 5 per cent of the employee's pay since last October.

Notices have been posted at the Bridgeport factories of the Crane Company announcing that a working schedule of 50 hr. a week will take effect Feb. 28. Last summer a strike for shorter hours was unsuccessful.

About 125 operatives in the rolling department of the Phillips Insulated Wire Works, Pawtucket, R. I., walked out on strike Feb. 4. An increase in pay is the object of the strikers but no demands have yet been presented as the men are unorganized and have not agreed upon the increase desired.

The new sheet brass building and casting shop of the Bristol Brass Company, Bristol, Conn., have been completed by the contractors five days ahead of schedule. Delay in fully equipping the buildings is probable as some equipment promised for delivery last November has not arrived.

The F. P. Lyons Iron Works Company, Manchester, N. H., has leased the lower floor of the building at 606 Willow Street and will remove its fire escape business to the new quarters. The old shop will be devoted wholly to structural iron work.

Rapid progress is being made in rebuilding the forge shop of the Winsted Edge Tool Works, Winsted, Conn., recently destroyed by fire.

The Builders Foundry Company, Boston, Mass., has been incorporated with capital of $5,000. R. B. Skinner is president.

The Woodlawn Machine Screw Company, Pawtucket, R. I., has been incorporated with capital of $100,000 by Joseph G. Doran and others of Providence.

The Waterbury Brass & Bronze Company, Waterbury, Conn., has been incorporated with capital of $10,000 by Henry L. Silver, Henry W. Even and Edward B. Reilley.

The Gorham Mfg. Company, Providence, R. I., will build a one-story addition, 122 x 144 ft.

The Scovill Mfg. Company has begun the erection of an oil-storage building, 25 x 231 ft., one story and basement.

The John Bath Company, Worcester, Mass., is moving the machinery of its Southbridge, Mass., plant to its Worcester plant in the Osgood Bradley Building.

The Connecticut Alloyed Metals Company, Bridgeport, Conn., which has been incorporated with a capital stock of $500,000, has purchased the plant of the United Foundry & Machine Company, a structure 100 x 185 ft., one story. It will build an addition 90 x 100 ft., to be completed about

Philadelphia

PHILADELPHIA, PA., Feb. 7, 1916.

Bids will be received in about two weeks for the construction of a six-story reinforced concrete and brick cabinet factory addition, 75 x 233 ft., for the Victor Talking Machine Company, Trenton, N. J. Ballinger & Perrot, 1211 Arch Street, Philadelphia, are the architects.

Morganthaler Brothers, Second Street north of Jackson, Philadelphia, have awarded contract to Koelle, Speth & Co., Twenty-sixth and Oxford streets, for the construction of a two-story brick machine shop, 36 x 40 ft., to cost about $2,500.

Joseph Neff, 16 East Lancaster Street, Ardmore, Pa., has awarded contract to Casper Bougiovanni, Ardmore, for a one-story brick machine shop, 36 x 40 ft., of brick construction. Henry L. Reinhold is the architect.

The Commercial Box & Envelope Company, Chester, Pa., is planning additions to its plant on the Delaware River which will increase its capacity several times. Work is started on the improvements and the first of four or more buildings is now being constructed. It will be 100 x 150 ft., one-story, of concrete and steel. An addition, 40 x 55 ft., two stories, will be added to the office building and later on two or more paper mills, 100 x 450 ft., one story, will be constructed. Benjamin B. McFadden of Philadelphia has been elected president.

The Farr & Bailey Mfg. Company, Camden, N. J., oil cloth manufacturer, has awarded contract to the Harrison C. Rea Company, 1027 Wood Street, Philadelphia, for the construction of a five-story reinforced concrete building, 88 x 92 ft., to cost about $55,000. Layton F. Smith, 513 Charles Street, Baltimore, is the architect.

The Millard F. Wilfong Iron Works Company, Fifty-second Street and Grays Avenue, Philadelphia, has awarded contract to the Belmont Iron Works, Twenty-second Street and Washington Avenue, Philadelphia, for the construction of a crane runway to cost about $1,000.

The C. F. Simonin & Sons Company, Tioga and Belgrade streets, Philadelphia, manufacturer of oils, has awarded contract to Harry Gil, Jr., 2515 Germantown Avenue, for the construction of a one-story brick and concrete addition to its factory, 50 x 55 ft.

White & Bro., Inc., smelter and refiner, Richmond and Hedley streets, Philadelphia, lost its entire copper smelting and refining department by fire Feb. 1 with a reported loss of $50,000. The company has immediately taken steps to renew it, and expects to be in running order again in that department in a month or two.

Baltimore

BALTIMORE, MD., Feb. 7, 1916.

A garage, 45 x 100 ft., will be built by Edward Bauernschmidt, 1528 North Gay Street, Baltimore. Plans are being prepared by B. F. Zipp, Parkville, Md.

The recently incorporated Maryland Metal Crosstie Company, Munsey Building, Baltimore, will erect a foundry 200 x 400 ft., for the manufacture of Gorrell patented metal ties.

The plant probably will be at or near Havre de Grace, Md. A. Freeborn Brown is president.

A plant for the manufacture of boilers is said to be planned by the Noreck Boiler Company, Richmond, Va.

Chicago

CHICAGO, ILL., Feb. 7, 1916.

One of the most interesting of the abnormal conditions now existing has to do with the enormous buying of small tools, drills, reamers and milling cutters, and in the face of price advances that would seem prohibitive. High speed drills regularly selling at $29 are bringing $187 and carbon tool steel has jumped from $22 to $110 for some sizes. Despite this, one company last week sent in a batch of 156 orders, one of which called for 15,000 drills of a size and several of 5000. Manufacturers are unable to meet the full demand nor their distributing stores the emergency demands which every day puts upon them.

In machinery lines demand for tools from local sources increases and more is heard from manufacturers who are being handicapped by reason of delayed deliveries or inability to purchase. Instances are reported where manufacturers having ordered tools are taking the castings and parts from the tool builders and finishing the machines themselves. In second-hand machinery the dealers report a decreasing volume of business, not because of a lessening demand but because of the scarcity of used machinery available for purchase. Another advance in the price of shaping machines has been announced; but it is the expectation that the upward trend of tool prices will shortly reach a period of adjustment, which will be followed by a more logical and somewhat lower level of prices.

The Light Car Axle Company, successor to the Clark Delivery Car Company, 1035 East Seventy-sixth Street, Chicago, will move its plant to Kalamazoo, Mich., this month. S. C. Kyle, president of the company, has announced that new equipment will be added.

Sargent & Lundy, engineers, 72 West Adams Street, Chicago, are preparing plans for a steam power plant for the Public Service Company of Northern Illinois at Brandon Bridge, near Joliet, which will cost about $1,000,000. Contracts for the building have been let.

The Stewart-Warner Speedometer Corporation, 1828 Diversey Parkway, Chicago, will build a six-story concrete factory at 2829 to 2843 North Lincoln Street, to cost $250,000. L. G. Hallberg & Co. are the architects.

The Hydro-Stone Products Company, Chicago, has leased a site at Fifty-seventh Avenue and Sixty-fifth Street, containing 65,000 sq. ft. A one-story concrete building, 120 x 200 ft., is being erected by the G. A. Johnson & Son Company, and will be leased to the Products Company for a term of fifteen years, with option to purchase.

The Enterprise Machinery Company, Chicago, has removed from 521 West Monroe Street, to 22 South Clinton Street.

The Ogren Motor Works, Waukegan, Ill., has plans for a new factory to cost approximately $150,000. Work will begin in the early spring.

The Pfanstiehl Electric Laboratory, North Chicago, Ill., has had plans prepared for a two and three-story factory addition.

The Machinery Specialty Company, Joliet, Ill., has purchased a plant at McDonough and Railroad streets, which it will occupy.

The Acme Chandelier & Mfg. Company, Fort Madison, Iowa, has leased to the Larsen Ice Machine Company the west half of its foundry building for use as a foundry department of the Ice Machine Company.

The Central Auto Company, Ottumwa, Iowa, is negotiating for a location at 108 West Market Street in which to install a garage and repair shop.

Detroit

DETROIT, MICH., Feb. 7, 1916.

At the annual meeting of the stockholders of the Detroit Steel Products Company, Detroit, held Feb. 2, plans were announced for an addition to its plant which will provide 60,000 sq. ft. additional floor space. Directors elected were M. P. Rumney, Henry Russell, C. H. O. Meyer, Walter S. Russell and Leo M. Butzel.

The Kelsey Wheel Company, Detroit, manufacturer of automobile wheels, has increased its capital stock from $1,000,000 to $1,500,000. It has enjoyed exceptional prosperity the past year.

The Lakeside Foundry Company, Detroit, has increased its capital stock from $40,000 to $120,000 to provide for increasing business. Its plant has recently been enlarged 50 per cent.

The Sterling Motor Company, Detroit, has increased its capital stock from $310,000 to $705,000.

The Crystal Machine Company, Detroit, has increased its capital stock from $10,000 to $25,000 and changed its name to the Crystal Washing Machine Company.

The Chevrolet Motor Company, Flint, Mich., will erect an additional manufacturing building immediately. It is reported that a large amount of equipment will be purchased.

The Colonial Mfg. Company, Zeeland, Mich., manufacturer of clocks and specialties, has increased its capital stock from $100,000 to $150,000 and has begun the erection of a two-story addition, 60 x 64 ft.

The Hart Specialty Company, Greenville, Mich., has been incorporated with $10,000 capital stock to manufacture toys. H. C. Fowler, H. L. Baker and F. W. Harrington are incorporators.

The Chicago File & Rasp Company, Chicago, has acquired a plant in Grand Haven, Mich., and will remove its business to the latter city. Additional equipment will be installed.

The Monroe Glass Company, Monroe, Mich., has been adjudicated a bankrupt, and the Security Trust Company, Detroit, appointed receiver. Assets are listed at $142,000 and liabilities at $125,000.

The Lehr Motor Company, Saginaw, Mich., has been incorporated with $500,000 capital stock to manufacture automobiles. The incorporators are W. M. Guider, Alfred F. Myer, Curt M. Schwan and Harry D. Mackaye. Manufacturing operations will be carried on at Saginaw.

The Mandel Brothers Mfg. Company, Chicago, will establish a branch plant at Benton Harbor, Mich. It manufactures phonographs, cameras, etc.

The Grand Rapids Brass Company, Grand Rapids, Mich., has increased its capital from $250,000 to $300,000 to provide for its new branch plant at Belding and other extensions.

The Wolverine Starter Company, Grand Rapids, Mich., has been organized with a capital of $10,000, and will manufacture a mechanical starter for automobiles at the Wolverine Brass Works, that city. J. Frank Carter is president of the company.

The Compostone Company, Grand Rapids, Mich., will erect a factory, 41 x 94 ft., three stories, of steel and concrete.

W. K. Prudden & Co., Lansing, Mich., have plans for a two-story addition to their plant, 70 x 540 ft., to cost approximately $50,000.

The Union Steam Pump Company, Battle Creek, Mich., has increased its capital stock from $600,000 to $1,000,000. No plant extensions are contemplated at present.

E. H. Oversmith, Marshall, Mich., is at the head of a new company, capitalized at $100,000, which proposes to engage in the manufacture of automobiles at Marshall.

Cincinnati

CINCINNATI, OHIO, Feb. 7, 1916.

A statement issued by the industrial department of the Cincinnati Chamber of Commerce shows a net increase in the capital stock of Cincinnati manufacturing companies for 1915 of $16,238,300. These figures include new incorporations as well as the net increases made by old companies. During the year 52 industrial plants made additions, and 31 new manufacturing firms were added to the city's industrial population.

A number of machine-tool builders report a slight improvement in domestic demand, with inquiries and orders scattered practically all over the country. Foreign business is dragging, although the Russian inquiries are still pending. Several foreign contracts for lathes and other machines will be completed March 1, and in some quarters it is believed additional orders will be placed, but for a more limited number of machine tools. In other words it is generally thought that the peak of foreign buying has been passed.

Jobbing foundries making a specialty of machine-tool castings are still busy, but have not as much work ahead as at this time last year. Makers of sugar machinery have a number of contracts in sight from Cuba and Louisiana.

The Fosdick Machine Tool Company, Cincinnati, has acquired an additional site adjoining its plant, but does not contemplate making any additions just now.

The Rapid Electrotype Company, Cincinnati, will soon let contract for a plant to be constructed on McMicken Avenue. Only transmission and special equipment will be required.

The Wray-Chase Motor Service Company, Cincinnati, with temporary offices in the Union Central Building, has been incorporated with $100,000 capital stock by J. Morris Wray, Wilson Chase, and others. A garage and repair shop will be established in the downtown district.

The Hamilton Otto Coke Company, Hamilton, Ohio, expects to have all equipment installed in its new by-product plant before March 1.

The Dayton Metal Products Company, Dayton, Ohio, contemplates making an addition to its plant to cost $75,000. Plans have not yet been completed.

The Kidder-Oswald Company, Dayton, Ohio, has recently received a large order from England for typewriter parts, and will probably add to its manufacturing facilities at an early date.

The Greater Dayton Association, Dayton, Ohio, has perfected plans for establishing a permanent exposition of all goods manufactured in that city. A building has not yet been secured.

The Dayton Structural Concrete Company, Dayton, Ohio, has commenced work on the addition to the plant of the Robbins & Myers Company, Springfield, Ohio.

The O. S. Kelly Company, Springfield, Ohio, is making an addition to its plant, 25 x 100 ft., one story. Little new equipment will be required.

H. W. Kindig, 58 East Spring Street, Columbus, Ohio, expects to establish a public garage and repair shop.

R. H. Evans & Co., 8 East Long Street, Columbus, Ohio, have been awarded contract for the construction of an assembling plant for the Ford Motor Company to be located at Cleveland and Buckingham avenues.

The Foster Stove Company, Ironton, Ohio, has let contract for a brick addition to its plant, 36 x 88 ft., two stories, to be used for storage purposes.

The daily press announces that the Rustler Mfg. Company, Springfield, Ohio, maker of sugar beet harvesting machines, will remove its plant to Piqua, Ohio, and greatly increase its manufacturing facilities.

Indianapolis

INDIANAPOLIS, IND., Feb. 7, 1916.

The City Council, Columbia City, Ind., will receive bids Feb. 14 for turbine and other machinery for improving the municipal light plant.

The Mais Motor Truck Company, Indianapolis, recently sold to J. C. Flowers, Joliet, Ill., representing the Premier Motor Corporation, will continue to manufacture motor trucks under the management of Edward W. Steinhart. The plant will be absorbed later on by the Premier Corporation.

The Oakes Company, Indianapolis, manufacturer of automobile parts, has orders booked a year ahead. It is proposed to enlarge the plant. The Oakes Pressed Steel Company and the Oakes Company, both manufacturers of automobile parts, were recently consolidated under the name of the Oakes Company and the capitalization was increased from $100,000 to $175,000. Warren D. Oakes was president of the Pressed Steel Company and Will H. Oakes president of the Oakes Company.

The M. S. Company, Indianapolis, has been incorporated with $10,000 capital stock to manufacture automobile heaters. The directors are W. E. Munk, J. C. Schaf, Jr., and R. G. Lockwood.

The Heaton Engine Company, Indianapolis, has been incorporated with $20,000 capital stock to manufacture engines. Otis Heaton, T. H. Johnston and A. M. Burk are the directors.

The American Carbureter Company, Indianapolis, has been incorporated with $25,000 capital stock to manufacture carbureters. The directors are H. C. Merriam, Ray C. Small and George L. Herrington.

The Van Briggle Motor Device Company, Indianapolis, has been organized to manufacture a carbureter. L. H. Van Briggle is president; Robert E. Hosea, vice-president; Henry S. Rominger, treasurer; Herbert M. Glossbrenner, secretary and Frank Bivins, engineer.

The Kramer Vacuum Brake Company, Anderson, Ind., has been incorporated with a capital stock of $25,000 to manufacture vacuum brakes and automobile specialties. The directors are Benjamin G. Kramer, Neel M. McCullough and Fred E. Mustard.

The Logansport Machine Company, Logansport, Ind., has been incorporated with a capital stock of $6,000 to manufacture scales and machinery. William Ball, Paul Kasch and Frank B. Wilkinson are the directors.

The Ward Dickey Steel Company, Crown Point, Ind., has changed its name to the Dickey Oil Engine Company.

Francis M. Lyon, attorney for the owners of the tin-plate mill at Greencastle, Ind., says there is probability of the plant being used for the manufacture of war munitions.

The Doddridge-Beck Company, Milton, Ind., has been incorporated with $125,000 capital stock to manufacture grave linings, casket linings and other cemetery supplies. The following are the officers: John C. Beck, Indianapolis, president; Oscar Kirlin, Joseph Ankenbrock and W. W. Houseworth, vice-presidents; Alice Napier, secretary-treasurer. The directors are George J. Myers, Indianapolis; James M. Doddridge, Centreville, Ind., and Milton Clawson, Indianapolis.

The Banta & Bender Company, Ligonier, Ind., has changed its name to the Ligonier Refrigerating Company.

Contract for the addition to the Portland Forge & Foundry Company, Portland, Ind., has been let to the Indiana Bridge Company, Muncie, Ind.

The Lindley Box Company will move its plants from Gas City and Dayton, Ohio, to Marion, Ind., where it will erect a factory.

The Vandalia Railway Company has plans for the erection of a roundhouse and shops at Bicknell, Ind., to cost about $350,000.

The Superior Machine Tool Company, Kokomo, Ind., at a recent meeting of the board of directors, adopted plans for the building of an addition to its plant to cost $50,000, adding largely to the machine shop.

Cleveland

CLEVELAND, OHIO, Feb. 7, 1916.

The volume of machine-tool business shows no falling off. Little export business is coming out in the local market and inquiry for machines to be used directly for making munitions has slackened; but the demand for machinery for plant extensions is heavy. These orders come from scattered sources, taking in about all the metal-working industries, and are for one up to a dozen or more machines. Among new inquiries is one from the Cleveland Automatic Machine Company for 20 standard machines for enlarging its production. Owing to delayed deliveries and prevailing prices few orders for machine tools for replacements are coming out. The demand for forging machinery is very active and orders are being placed for delivery in the spring of 1917. Conditions in the machinery trade do not offer much inducement to the railroads to buy and not much business is coming from this source.

The Cleveland Steel Valve Company, recently organized with a capital stock of $25,000, has purchased the plant of the Seneca Chain Company, Kent, Ohio, which it will place in operation. H. B. Redding, formerly superintendent of the Ferro Machine & Foundry Company, is at the head of the company.

The American Steel & Wire Company has taken bids for the following machines for one of its Cleveland plants: One traveling head shaping machine, bench geared crank shaping machine, 8-ft. vertical boring mill, wet tool grinding machine, drill grinding machine and a keyseating machine.

The Electric Railway Improvement Company, Cleveland, has acquired a site for a factory at Carnegie Avenue and East Sixty-first Street.

The Euclid Glass Works of the General Electric Company, Cleveland, plans the erection of two factory additions, one 50 x 65 ft., and the other 35 x 50 ft. Isant & Frink, Illuminating Building, Cleveland, are the architects and engineers.

The Premier Aluminum Foundry Company, Cleveland, has placed a new aluminum, brass and copper foundry in operation on Ivanhoe Road.

The Crescent Brass & Mfg. Company, Cleveland, has had plans prepared for a one-story factory addition, to cost $15,000.

Barberton, Ohio, has an inquiry out for machinery equipment for the manual training department of the public schools. The list, in addition to small tools, includes the following: One 24-in. single cylinder surfacing machine with motor drive, one oilstone grinding machine, one 18-in. band sawing machine, one universal saw bench and countershaft, one 16-in. hand planing and jointing machine with motor drive, six under drive speed lathes with motor drive, one down draft forge.

The East Iron & Machine Company, Lima, Ohio, has had plans prepared for an additional building for making asphalt machinery. Its present plant is filled with orders for automatic machinery.

The Kelly-Springfield Rubber Company, Akron, Ohio, has

acquired a site at Barberton, Ohio, on which it plans to erect a plant.

The Mason Tire & Rubber Company, Kent, Ohio, has awarded contracts for an addition to cost $50,000.

The Champion Hardware Company, Geneva, Ohio, will enlarge its plant by an extension to its foundry and other additions. Another unit of about 200 hp. will be installed later.

The Niles Forge & Mfg. Company, Niles, Ohio, is building an additional machine shop, 25 x 100 ft.

The Barrett Mfg. Company, 17 Battery Place, New York, will establish a branch plant, 200 x 400 ft., in Ironville, Ohio.

The plant of the Seneca Chain Company, Mansfield, Ohio, has been taken over by the Standard Chain Company, Pittsburgh. It is running at full capacity and some extensions will probably be made.

The Eagle-Macomber Motor Car Company will establish a plant and main office in Sandusky, Ohio. The building formerly occupied by the Suspension Roller Bearing Company will be used for assembling purposes.

The Twentieth Century Heating & Ventilating Company, Akron, Ohio, is planning a factory extension.

The Columbia Steel Company, Elyria, Ohio, will enlarge its plant by the erection of an annealing building, 60 x 80 ft., and a pickling department, 40 x 160 ft., both of brick.

The Salem Rubber Company, Salem, Ohio, is being organized with a capital stock of $600,000 to take over the plant of the American Case & Register Company for the manufacture of automobile tires. A. E. Gordon, Canton, Ohio, is a promoter of the new company.

The Standard Steel Tube Company, Toledo, Ohio, will increase its capital stock from $150,000 to $300,000.

The Refrigerating Engineering Company, Toledo, Ohio, has been organized to build a patent refrigerator machine and will occupy space in the Toledo Factories Building. C. A. Peckham, vice-president and general manager of the Toledo Bridge & Crane Company, is president and F. R. Riley, secretary and treasurer.

Milwaukee

MILWAUKEE, WIS., Feb. 7, 1916.

It appears from the increasing inquiries and bookings of single or small-lot orders for tools that smaller buyers are again out to fill their requirements, in most cases for plant extensions. For some time business has been confined to large lots and the necessity for turning down some of these in certain cases seems to have made small buyers afraid to make their wants known. The slight slackening of large-lot business noted in the past week has had the effect of bringing them into the market. It will be some time before builders reach the new business, however, as the rush to fill old orders has not abated. The extension of capacity by a large railroad malleable casting interest and the temporary interruption of operations by a large aluminum foundry because of a shortage of raw materials are features of the week's news.

The Lake Superior Electrical Company, Superior, Wis., recently organized with $50,000 capital to manufacture electrical appliances, intends to begin operations Feb. 15 in the Lamborn Avenue wing of the Superior Iron Works plant. It has booked orders which will keep the plant busy for twelve months or more. Machinery has been purchased. It will erect its own plant at an early date. M. B. Benson is president. The Superior Iron Works has built a brick addition to its main building and does not intend to curtail its capacity.

The Kissel Motor Car Company, Hartford, Wis., has purchased a tract of 17 acres adjoining its plant to provide room for future extensions and additional storage and switchyard facilities. Plans are being prepared for several additions, to be undertaken when buildings now under way are completed.

A dairy and cold storage plant costing $30,000 will be established at Monticello, Wis., by Edward Wittewer & Co. It will be 50 x 150 ft., three stories. Claude & Starck, architects, Madison, Wis., are in charge.

The Great Lakes Boat Building Corporation, Milwaukee, has been incorporated with a capital stock of $200,000 to engage in the construction and equipment of yachts, boats and steamers. It takes over the St. Louis Yacht & Boat Company, St. Louis, and the Milwaukee Yacht & Boat Company, Milwaukee, and will consolidate operations at the Milwaukee company's yards, 333 Becher Street. The syndicate is headed by Judson B. Houghton and W. C. Morehead, St. Louis, and Reed H. Hubbell, Milwaukee. Walter D. Beauvais is chief engineer and W. W. Sherman is works manager. It is announced that headquarters will be in Milwaukee.

The Heil Company, Twenty-sixth and Montana avenues, Milwaukee, structural iron, sheet metal, etc., has increased its capital stock from $20,000 to $50,000 in preparation for enlarging its activities. Julius P. Heil is president and general manager.

The Garage Equipment Mfg. Company, 742 South Pierce Street, Milwaukee, has filed notice of a change in the corporate style to the Gemco Mfg. Company.

The Edward Fisher Garage, Pinckney and Doty streets, Madison, Wis., will be rebuilt and enlarged at once. The shop equipment will be increased.

Plans for the new machine shop, factory and garage to be built by the Carter Auto & Machine Company at Fifty-first and National avenues, West Allis, Wis., are being revised to make the building 72 x 124 ft., two stories and basement. Work will begin March 1. Charles L. Lesser is architect.

A $20,000 harness and saddlery factory will be erected at once by Peter Reiss at Sheboygan, Wis., for occupancy by the J. C. Nichols Harness Company, which will move its plant and offices from Janesville, Wis., to Sheboygan. The factory will be of brick and mill construction, 80 x 144 ft., four stories and basement and cost about $25,000. Practically all the machinery and equipment will be new. Hilton & Sadler, architects, Janesville, are preparing plans.

The business conducted under the style of Vesper Iron Works at Vesper, Wis., for many years by C. R. Goldsworthy, Louis Grieb and H. H. Wabers, has been incorporated under the same name. The capital stock is $10,000. The company intends to enlarge the line of farm and garden tools it produces.

The Townsend Mfg. Company, Beloit, Wis., manufacturing general utility gas tractors, is contemplating removal to Evansville, Wis. Negotiations are under way for the purchase of the former plant of the Frost Mfg. Company, Evansville.

The municipal waterworks commission, Two Rivers, Wis., has received authority to purchase two new high-pressure boilers and additional pumping equipment. Bids will be asked at once.

Foeller & Schober, architects, Fox Block, Green Bay, Wis., have been engaged by the Board of Education, Green Bay, to prepare plans for the proposed new East Side high school, to cost $125,000. It is planned to make the manual training department particularly large. A light, heat and power plant will be included in the plans.

A 300-ft. bucket bridge at the Commerce Street dock of the Milwaukee-Western Fuel Company, Milwaukee, collapsed on Feb. 3, probably due to the effect of extremely cold weather. It is believed the crane will have to be entirely rebuilt. William F. Arden is superintendent.

The Western Malleables Company, Beaver Dam, Wis., which purchased the assets of the defunct Beaver Dam Malleable Iron Company two years ago, on Feb. 1 placed in operation its South Center Street foundry, the second of the group of three at Beaver Dam now producing. Orders have been increasing steadily, making extension of available capacity urgent. The Center plant has been idle for a long time. The company is a large producer of tie plates and other railroad malleable castings and the increased activity is attributed to heavier demand from railroads.

The Cutler-Hammer Mfg. Company, Milwaukee, encountered a strike in its machine shop last week, the men claiming that a speed system had been installed, and a foreman supplanted by a stop-watch efficiency engineer. No serious consequences were noted.

Fire completely destroyed the roundhouse of the Wisconsin & Northwestern Railway at Bird Center, Wis.

Birmingham

BIRMINGHAM, ALA., Feb. 7, 1916.

Inquiries from rural merchants indicate a brisk business in agricultural machinery. General trade has experienced a lull of moderate proportions. The demand from mines and wood-working plants for machine tools remains very good and electrical appliances are selling in a steady volume.

The Atlas Cotton Cleaner Company, Birmingham, has been organized with a capital stock of $50,000 by G. C. and J. C. Stacey, J. A. White, and others.

H. H. Comer, president Eufaula Cotton Oil Company, Eufaula, Ala., will install machinery for manufacturing peanut products.

The Hobbie Elevator Company, Montgomery, Ala., has made final arrangements for erecting a grain elevator with capacity of 50,000 bu., to cost about $50,000.

A. H. Brenner, Augusta, Ga.; George H. McFadden & Bro., 121 Chestnut Street, Philadelphia, Pa., and others are

planning to expend $250,000 in establishing a cotton compress and warehouse in Augusta with a storage capacity of 77,000 bales, 67 compartments, etc.

The Peninsular Iron Works, Lakeland, Fla., has been organized by C. V. Turner, and others, with a capital stock of $20,000.

The Hardie Mfg. Company, Hudson, Mich., plans the establishment at Tampa, Fla., of a plant for assembling spraying machinery manufactured at Hudson.

The Central South

LOUISVILLE, KY., Feb. 7, 1916.

Business conditions are very good, and trade is brisk. One of the encouraging features is the splendid condition of the hardwood lumber business, which is more active than it has been for several years. While weather conditions are enforcing reduced operations in this line in some points in the South, the prospects are for heavy consumption of machinery in that trade from now on. An unusually large number of lighting plants are projected in this territory, while the demand for small machine tools and other equipment for automobile garages continues good.

The Illinois Central Railway, general office Chicago, will build a wood-working plant, roundhouse and shop buildings in Louisville. A motor-driven 85-ft. turntable is specified.

The Adler Mfg. Company, Louisville, is enlarging its piano factory at Twenty-ninth and Chestnut streets at a cost of $15,000.

The Louisville Gas & Electric Company has let a contract for the turbines to be installed in its new power plant, which will cost $1,000,000 to the General Electric Company. Construction work has been begun.

L. F. Steele, Hustonville, Ky., and George B. Pruitt, Moreland, Ky., are planning to establish an ice factory at Moreland. The company is to be capitalized at $15,000.

The Kentucky Light & Power Company is planning improvements in its plant at Hartford, Ky. Some of the equipment contracts have already been let. A. E. Barrass is plant manager.

H. G. Skiles and Morris Perkins, Crab Orchard, Ky., are arranging for the establishment of an electric light plant. The town will sell them a franchise March 7.

J. J. Bell, Lexington, Ky., is planning the establishment of an electric light plant and water system at Whitesburg, Ky.

A local company is being organized at Campbellsburg, Ky., to establish an electric light plant under a franchise to be sold this week. Louis Coblin may be addressed.

W. S. Chandler, Mt. Olivet, Ky., will establish an electric light plant. Work on the power-house will begin soon. A street lighting system will be installed.

S. M. Ware & Son, Lone Oak, Ky., are planning to add a dynamo to the equipment of their flour mill and to manufacture current for a local lighting system.

The Pearsite Company, Clay City, Ky., which recently began the manufacture of dyestuffs, is planning the erection of another plant in the eastern Kentucky coal fields.

A. E. Jennings, Central City, Ky., will establish a clay tile plant at Rockport, Ky.

The Anglo-American Mill Company, Owensboro, Ky., has increased its capitalization from $260,000 to $500,000 for the purpose of financing the construction of an addition to its plant.

The ice factory of Fisher & Heidt, Evansville, Ind., was damaged recently to the extent of $30,000 by an explosion.

L. A. Kahl, Palmyra, Ind., will equip an electric light plant.

The Lafolette Ice Company, Lafollette, Tenn., has been incorporated with $10,000 capital stock and will erect a factory. Frederick A. Joss is president and W. S. Bailey general manager.

The Tennessee Stove Works, Chattanooga, Tenn., announces that three more buildings costing $50,000 will be erected, including an addition to the foundry, 75 x 200 ft.; a nickel-plating department, 40 x 50 ft., and a storage building, 100 x 200 ft. J. L. Caldwell is president.

A. B. duPont and R. W. White, New York, who are interested in some of the new industries which are now being established at Kingsport, Tenn., have announced that plans are being considered for the manufacture of chlorine gas at that point.

The John G. Duncan Company, Knoxville, Tenn., is in the market for a second-hand horizontal return tubular high-pressure boiler, 100 to 150 hp.

G. T. Harris, Morristown, Tenn., and K. T. Kenner, Rogersville, Tenn., will build and equip an automobile garage at Morristown.

The Lone Mountain Milling Company, Lone Mountain, Tenn., is in the market for power and special equipment for the mill which it will erect at a cost of $50,000.

Harold Holbrook and Hooker Williams, Hartford, Ky., have purchased an ice factory there, and will enlarge its capacity.

The Casey-Hedges Company, Chattanooga, Tenn., will build an addition to its plant. Charles E. Bearden, First National Bank Building, Chattanooga, is the architect.

St. Louis

ST. LOUIS, MO., Feb. 7, 1916.

Practically all classes of equipment are wanted and where deliveries can be made no one hesitates a moment in paying prices asked. In many lines a sold-up condition exists which will scarcely be relieved for some months. Industrial plants whose product is remote from the war class are seeking more and more new equipment, as, for instance, the shoe industry, which in this section has indulged in no war orders, is now hard put to it to keep its plants in full operating capacity. The market is as bare of second-hand tools as of new equipment. Banking conditions are easy and investment funds are in good supply. Collections are excellent.

The Triangle Motor & Sales Company, St. Louis, Mo., has been incorporated with a capital stock of $15,000 by Frederick Grinham, Daniel G. Taylor and John Brodhead.

The American Mfg. Company, St. Louis, Mo., will erect an addition to its plant for the manufacture of rope, etc.

St. Louis, Mo., is proceeding with the construction of a temporary dock on its river front and will include the installation of two electric cranes to cost about $13,000 and to be utilized on the permanent dock to be built when plans are prepared.

The Muldoon-Mertz Company, St. Louis, Mo., has acquired quarters at 700 North Sixteenth Street, where it will equip for the manufacture of electric signs, etc.

The Banner Ice Company, East St. Louis, Ill., will double the capacity of its ice manufacturing plant early in the year. Plans are being prepared.

The Motor Instruction & Engineering Company, St. Louis, Mo., has been incorporated with a capital stock of $20,000 and will equip a plant for instruction in operation and also construction of automobile, aeroplane and other motors. Charles E. Brooks, John E. Phillips, Arthur Rudolph, and others, are stockholders.

The Columbia Quarry Company, St. Louis, Mo., has increased its capital stock from $100,000 to $300,000 and will increase its equipment. C. H. Krause is president.

The Great Western Smelting & Refining Company will build a one-story foundry and three-story warehouse at 3108 North Broadway, St. Louis, Mo., to cost about $50,000. The J. Hill Construction Company has been awarded the contract.

The Brunk Mfg. Company, St. Louis, Mo., has been organized with a capital of $4,000 to manufacture jacks. The incorporators are Charles O. A. Brunk, Eugene W. Brunk and John H. Wolf.

H. Ehrlich & Sons, St. Joseph, Mo., have placed an order for a quantity of new machinery and expect to enlarge the output of their plant.

The Security Adding Machine Company, St. Louis, Mo., has been incorporated with a capital stock of $50,000 by F. W. Quackenboss, Leo Rassieur, Jr., and C. A. Marquis.

The Continental Auto Top Company, St. Louis, Mo., has acquired a site and will erect a new plant for the manufacture of automobile tops and bodies.

The Hudson-Phillips Motor Car Company, St. Louis, will erect a garage, machine shop, etc.

The Berry Conser Mfg. Company, St. Joseph, Mo., has been incorporated with a capital stock of $16,000 by Joseph E. Berry, William A. Conser and Frank B. Fulkerson to manufacture machinery.

The McDowell Motor Car Company, Kansas City, Mo., has been incorporated with a capital stock of $14,000 by W. P. McDowell, Frank J. Hall and R. L. Stancliff.

Gravette, Ark., will improve its electric light plant by the installation of new boilers, generators, engines and pumps. E. H. Crayton is superintendent.

The Booneville Light & Power Company, Booneville, Ark., will add to its generating equipment. H. P. Harley is manager.

The Grand Prairie Canal Company, Devall Bluff, Ark., will erect a pumping station on the White River to supply water for rice growing.

The Gun Stock Mfg. Company, Chillicothe, Mo., has been incorporated with a capital stock of $25,000 by O. A. Myers, George W. Williamson and William J. Morris to manufacture gunstocks.

The Crane Motor Car Company, Crane, Mo., has been incorporated with a capital stock of $15,000 by T. B. Robertson, James Williams and Neil Robertson.

Mount Vernon, Mo., will erect and equip an electric light and power plant, spending about $10,000 on equipment. Albert C. Moore, Joplin, Mo., is engineer in charge.

The Alton Slater Waterworks Company, Slater, Mo., will construct a waterworks plant to cost about $110,000.

The Pine Bluff Compress & Warehouse Company, Pine Bluff, Ark., will equip a compress of 1800 bales daily capacity to replace its burned plant. The buildings will cost $30,000.

The Ashdown Light and Power Company, Ashdown, Ark., will install two oil engines of 25 and 75 hp. capacity.

The Arkansas Light & Power Company, Arkadelphia, Ark., will install a new engine and generator at its Marianna plant. Its Morrilton plant will be rebuilt and re-equipped and plans are being prepared therefor. New engines and generators are also to be installed at Newport.

W. C. Byington, Tylertown, Miss., has acquired a building at Monticello, Ark., which he will equip as a machine shop. He is in the market for equipment.

Barton Brothers, Chickasha, Okla., will increase the capacity of their machine shop and garage.

Shamrock, Okla., will install an engine and a centrifugal pump in connection with its waterworks plant.

In the issue of THE IRON AGE of Jan. 20, on page 240, the Pontotoc Electric Light & Power Company, through an oversight in proof reading, was erroneously located at Pontotoc, Mich. The town is situated in Mississippi.

The W. M. Carter Lumber Company, Laurel, Miss., will build and equip a sawmill at Eucutta, Miss., of 20,000 ft. daily capacity. Charles N. Carter, Laurel, will be manager.

The Anderson-Tully Company, Vicksburg, Miss., has plans for the equipment of a sawmill to cost about $50,000.

New Iberia, La., will equip a sewage system to cost about $80,000. Machinery is now being sought. X. A. Kramer, Magnolia, Miss., is the engineer.

The By-Products Reclaiming Company, 129 Front Street, New Orleans, La., W. H. Reid, president, has plans to equip plants at New Orleans, Boston, Mass., and Brooklyn, N. Y. Special machinery is to be built.

DeLatte & LaGrange, Lake Charles, La., with a capital of $40,000, will equip for the manufacture of brick and are in the market for machinery.

Texas

AUSTIN, TEX., Feb. 5, 1916.

Cold and disagreeable weather caused a falling off in machinery and tool trade activities. The demand for irrigation pumping machinery shows an increase over what it was a year ago. Many manufacturing plants are installing new machinery.

The Texas Airline Interurban Company is being organized to construct an interurban electric railway between Columbus and Gonzales and between Austin and Port Lavaca. Part of the right of way has been obtained and construction work will be started in a short time. Ben B. Hunt, Columbus, is promoting the project.

The Koehring Machine Company, Dallas, has been organized by George W. Smith and others.

The Western Tire & Garage Company, Texico, N. M., has been organized with a capital stock of $1,000,000, and will construct a machine shop and garage. C. D. Robertson is in charge.

The Mimbres Valley Irrigation Company, Deming, N. M., plans to install pumping machinery and to enlarge its irrigation operations. C. L. Baker is manager.

The Mexican Northern Power Company will soon resume work on its large power project at Boquilla, Chihuahua, Mexico. The big dam across the Conchos River came through the revolutions unscathed and the hydroelectric plant and power transmission system will be built as rapidly as possible.

James N. Lemond, Waco, and associates plan to build a 40-ton cottonseed oil mill and a 60-ton balanced ration feed mill at Plainview.

The cotton compress of the Memphis Cotton Compress Company at Memphis, Tex., which was destroyed by fire recently, will be rebuilt.

The Duff-McNey Foundry & Machine Company, Temple, will install new machinery and engage its manufacture of farm machinery and meter boxes.

The Groesbeck Brick Company, Groesbeck, which has a capital stock of $17,000, will engage its manufacture of brick. C. S. Bradley is a stockholder.

D. C. Priddy and associates plan to build a dam in Palo Duro Canyon, near Amarillo, and construct a pumping plant to supply the towns of Amarillo and Canyon.

The Freeport Sulphur Company is constructing a water storage reservoir of 40,000,000 gal. capacity near Freeport.

The Missouri, Kansas & Texas Railway Company of Texas had made an appropriation of $10,000,000 for improvements and betterments to its lines in this State during the next three years. The shops will be enlarged and new machinery installed.

The Pacific Coast

SAN FRANCISCO, CAL., Feb. 1, 1916.

The general demand for machinery is steadily broadening, as manufacturing requirements increase and development operations are resumed. Orders for mill and wood-working machinery are appearing with more frequency, and electrical machinery also receives more attention. A number of mineral development projects are ready to go ahead as soon as the rains are over, and there are many inquiries for irrigation equipment of all degrees of magnitude. Aside from a natural improvement in oil-well equipment, the destruction of hundreds of rigs by storm in the San Joaquin Valley has caused an abnormal demand there. A great deal of heavy construction will also be necessary to repair recent flood damage in the southern end of the State. Metal-working shops practically everywhere are much busier, but the smaller shops are not buying tools except for absolute necessities, showing a reluctance to place orders for distant delivery at present prices. Some substantial orders, however, are coming from the larger interests, which have work to keep them busy beyond the present year.

The Union Iron Works, San Francisco, has announced that work will be started shortly on the new Hunter's Point drydock and other important improvements. An order has been placed by it with Fred Ward & Son for eight 20-in. x 14-ft. American lathes, to be delivered this year.

The Moore & Scott Iron Works, with shipbuilding facilities in Oakland, has taken some large steamer contracts, including one for foreign interests, and has placed an order for a 24-in. x 16-ft. geared-head American motor-driven lathe, and a 3-ft. American radial drill.

The Holmes-Eureka Lumber Company, Eureka, Cal., will install a new band saw and other machinery to double the capacity of its plant.

The Union Lumber Company, Fort Bragg, Cal., has plans under way for a new planing mill and dry kilns.

Fred Patterson and James Bryant have leased A. E. Shedd's machine shop at Madera, Cal.

The American Can Company has called for bids on a factory to be built at Los Angeles, at an estimated cost of about $500,000.

The Marine Mechanical Works has secured a permit to build and operate a marine construction and repair shop on tide land owned by the city of Los Angeles.

The California Door Company, San Francisco, has plans for a plant to be built at Diamond Springs, Cal., for the manufacture of box shooks, door stock, etc.

The Alaska Packers' Association, San Francisco, has placed a contract with a Seattle firm for six large radio stations to be installed at its Alaska canneries.

Plans are announced by the Hercules Powder Company for a kelp reduction plant, for the production of potash, in the vicinity of San Diego, Cal.

The Victor Motor Company has leased the Ames pump factory, Niles, Cal., and is starting the manufacture of stationary and traction engines with a force of 50 men.

Horace G. Campbell, Westlake, Ore., has received permit to erect a plant at the outlet of Whoahink Lake, where 145 hp. will be developed at a cost of about $5,000.

The emergency power plant at Morgan Lake, Ore., owned by the Eastern Oregon Light & Power Company, La Grande, Ore., was destroyed by fire.

Canada

TORONTO, Feb. 7, 1916.

Canada's manufacturing industry at present and its immediate prospects are greatly in advance of what they have ever been before. The steel companies lead in prosperity. They are required to work double shifts with considerable overtime in order to keep up with the demand. The Standard Smelting Company's plant at Chippewa, Ont., recently resumed operations. At present iron is the only metal treated. The company is building a new plant which will be used for smelting nickel ore. The Canadian Government has come to an agreement with the International Nickel Company whereby the latter will establish a refinery in Canada.

The farm implement trade in Canada is exceptionally brisk. The majority of warehouses in Western Canada are completely sold out and farm machinery firms announce that farmers are settling up their indebtedness this season as never before. Railway construction is fairly quiet. Some companies announced they will discontinue extensions until after the war. Australia is asking for quotations on railway equipment from Canadian manufacturers. It was recently announced that the Federal Government would make provisions whereby the special machinery which has been installed for the manufacture of war munitions will be made use of after the war. Machinery and equipment for waterworks plants and like undertakings will be in demand shortly.

The Chalmers Motor Car Company, Windsor, Ont., has been incorporated with a capital stock of $1,000,000 by Clarence A. Pfeffer, vice-president and secretary; Hugh Chalmers, William P. Kiser, all of Detroit, Mich., and Alexander R. Bartlet, Windsor, Ont., and will build a plant at either Windsor or Walkerville, Ont.

The Maxwell Motor Company, Detroit, Mich., proposes to establish a branch factory at Windsor, Ont.

Robert Reid, Broderick, Sask., is in the market for a screw-cutting engine lathe, about 18-in. swing, gap bed.

P. G. Dunham, Windsor Hotel, Montreal, will receive sealed proposals for supplying one 200-hp. engine and one 200-kw., 220-volt, direct-current generator.

The McClary Mfg. Company, London, Ont., has received an order for field kitchens for the Canadian army, to cost $100,000.

The Canada Pipe & Steel Company, Atlantic Avenue, Toronto, will build an addition to its machine shop, to cost $3,000.

The Hamilton Gear & Machine Company, Ltd., 15 Van Horne Street, Toronto, will build an addition to its plant, to cost $5,000.

The Hamilton Carbureter Company, 535 Queen Street, East, Toronto, will build an addition to its factory, to be started at once.

Plans are being prepared for a factory to be erected at Montreal, for the Northern Electric Company, 121 Shearer Street, to be of steel and corrugated iron construction.

The Oneida Community, Ltd., Oneida, N. Y., will establish a plant at Niagara Falls, Ont., for the manufacture of silverware. A. Reeves is in charge.

The Laura Secord Canada Company will build a fctory and warehouse at 64 Princess Street, Toronto, to cost $15,000. F. P. O'Connor, 354 Yonge Street, is proprietor.

Frank Tyrrel, Hagersville, Ont., is receiving prices and information on wood-working machinery.

Wright & Co., 30 Mutual Street, Toronto, Ont., is in the market for an electro-plating dynamo.

The Steel Company of Canada, Hamilton, Ont., has taken over the plant of the Gananoque Bolt Company, Gananoque, Ont., and will install drop-forging equipment, etc.

The Universal Stove & Furnace Company is considering the erection of a plant at Windsor, Ont., for the manufacture of stoves, furnaces, etc.

The Steel Foundry of Quebec, Ltd., Quebec, has been incorporated with a capital stock of $49,000 by J. A. Larue, E. Massicotte, E. Trudel, and others, to manufacture machinery, iron, steel, etc.

The Sudbury Construction & Machinery Company, Ltd., Sudbury, Ont., has commenced the construction of brick and steel extensions to its plant, to cost about $6,000, including an addition to the foundry, 30 x 40 ft., to be devoted to brass castings; the construction of a cupola house, 30 x 40 ft., and the installation of a furnace which will increase its capacity 50 per cent, giving it a total of 150 tons a month; and a new cleaning house. The additions will give about 2600 sq. ft. additional floor space and the equipment will include a 7½-ton crane. The company is working at full capacity with a force of about 70 hands. A great deal of its work consists of repairs to mining, smelting and lumbering machinery, indicating the active conditions of these industries.

The Toronto Laundry Machine Company, Dundas Street, and Sorauren Avenue, Toronto, will build an addition to its plant, to cost $2,800.

Montreal, Que., will have plans prepared for the construction of a hydroelectric power and pumping station to be built at the end of the aqueduct canal. It will have a capacity of 10,000 hp., and will cost complete $1,500,000. Frederick E. Field, Atwater Avenue, Point St. Charles, Que., is the engineer.

C. Decarie, of the Imperial Munitions Committee, is interested in a company which is contemplating the erection of a factory in Notre Dame de Grace ward, Montreal, to manufacture fuses, etc.

The Harmsworth paper plant at Grand Falls, Newfoundland, operated by the Anglo-Newfoundland Development Company was damaged by fire Feb. 3 with a loss of about $100,000.

The International Time Recorder Company, Binghamton, N. Y., has formed a separate corporation in Canada to be known as the International Time Recorder Company of Canada, which has purchased the W. A. Wood Company plant at Montreal. It will also establish a factory at Toronto, about April 1, for the manufacture of time clocks, recorders, etc. J. E. Rogers has been elected president and F. E. Millen general manager.

The Perfection Tire & Motor Company, Ltd., Hamilton, Ont., has been incorporated with a capital stock of $1,000,000 by Charles F. Cole, president of the Champion Auto Equipment Company, Chicago, Ill.; Larkin A. Rockwell, Elwood A. Stickelman, and others, all of Chicago, to manufacture automobiles, tires, etc.

The Canadian Meter Company, Ltd., Hamilton, Ont., has been incorporated with a capital stock of $200,000 by Edward H. Ambrose, John R. Marshall, John B. McNary, and others, to manufacture meters, etc.

H. Muehlstein & Co., Ltd., Montreal, have been incorporated with a capital stock of $10,000 by Joseph A. Perodeau, Francis E. McKenna, Paul S. Conroy, and others, to manufacture rubber, tires, etc.

The Prescott Mfg. Company, Ltd., Prescott, Ont., has been incorporated with a capital stock of $200,000 by James B. White, John P. Dunne, M. J. Coffey, and others, to manufacture abrasive wheels, machinery, etc.

The Consolidate Mining & Smelting Company of Canada, Trail, B. C., has been granted permission to increase its capital stock from $7,500,000 to $15,000,000.

William Hay, Ailsa Craig, Ont., will purchase electrical equipment to operate his mill machinery.

Wellesley, Ont., will shortly call for tenders for the construction of an electric distribution plant to cost $7,500. P. F. Schummer, St. Clements, Ont., is town clerk.

Maillardville, B. C., will install a waterworks plant and system to cost $10,000.

Sault au Recollet, Que., is considering the construction of a sewage system, water supply system and filtration plant to cost $250,000.

Tisdale Township, Ont., will purchase an electrically driven fire pump to cost about $5,000. W. H. Wilson, South Porcupine, Ont., is clerk.

The Queen City Oil Company, Montreal, Que., contemplates the construction of a large oil refinery.

Bourne & McDonald, attorneys, Vancouver, B. C., have for sale a sawmill and planing mill with capacity of 100,000 ft. every 10 hr.

Government Purchases

WASHINGTON, D. C., Feb. 7, 1916.

Bids will be received by the Bureau of Supplies and Accounts, Navy Department, Washington, schedule 9283, for one 15-hp. induction motor for Mare Island; schedule 9269, for one 30-in. disk grinding machine, one core wire straightening machine and schedule 9278, for miscellaneous valve-reseating machines, all for Norfolk.

The United States engineer office, 405 Custom House, Cincinnati, will receive sealed proposals until 2 p. m., Feb. 23, for new towboat boilers.

The supervising architect, Treasury Department, Washington, will open sealed proposals at 3 p. m. Feb. 17 for the construction of an extension to the experiment station powerhouse, Bureau of Mines, Pittsburgh, Pa. He will also open sealed proposals at 3 p. m., March 1, for a new engine and generator for the post office and court house at Philadelphia, Pa.

*No date set for receiving bids.

NEW TRADE PUBLICATIONS

Portable Steel Buildings.—Trussed Concrete Steel Company, Detroit, Mich. Catalog. Describes and illustrates a line of portable buildings with pressed steel panels. The advantages of this design, which include fireproofness, permanence, ease of erection, portability, flexibility, resistance to weather conditions, good appearance and economy, are briefly touched upon and there are a number of views showing the buildings being erected. The various structures which range from small garages to large general shops for manufacturing purposes and include contractors' houses, hospital buildings, factory buildings of all types, etc., have as a rule a page given to each with an exterior view, the ground plan and a condensed set of specifications.

Oxy-Acetylene Apparatus.—Imperial Brass Mfg. Company, 1210 West Harrison Street, Chicago, Ill. Catalog No. 132. Illustrates a line of oxy-acetylene welding and cutting equipment for use in all industries employing machinery and working metals. The uses of the equipment in these industries are briefly touched upon, followed by a general description of it with special reference to the mechanical means employed to secure a mixture of the oxygen and the acetylene. The different torches are described and this is followed by illustrated descriptions and specifications of the different outfits that can be supplied. Mention is made of accessories such as welding rods and flux, goggles, hose, etc. A number of illustrations of work done with the apparatus are included and figures on the savings effected are presented in most cases.

Calendar.—National Transit Pump & Machine Company, Oil City, Pa. Hanger measuring 8⅓ x 14 in. The center of the hanger contains a bird's-eye view of the plant of the company, and with the exception of the name on the roof of one of the buildings and an inconspicuous line on the hanger giving the name and location, there is no advertising. The pad differs from the conventional type in having the days of the week arranged vertically instead of horizontally. Although small, the figures are easily read.

Steel Forms for Concrete Construction.—Hydraulic Pressed Steel Company, Cleveland, Ohio. Booklet. Size, 5 x 8 in.; pages, 95. Pertains to a line of pressed steel forms for retaining walls, reservoirs, building foundations and walls, garages, tunnels, culverts, tanks, etc. The process of manufacture, the various units of the system and the advantages are described in the first eleven pages. Following this are approximately thirty pages of illustrations of different numbers of the system and the remainder of the book is given over to drawings and engravings showing the method of using the forms by illustrations of work that has been done.

Internal Combustion Engine Specialties.—Generator Valve Company, 294 Taaffe Place, Brooklyn, N. Y. Catalog. Pertains to a line of internal combustion engine specialties which includes carbureters, valves of various types, spark plugs, oilers, strainers, inlet and exhaust connections, etc. All of the various devices are illustrated and briefly described and tables of the different sizes that can be furnished are included.

Rubber Covered Screw Driver.—H. D. Smith & Co., Plantsville, Conn. Circular. Calls attention to a screw driver in which the handle and the shank are covered with rubber, the joint between the covering and the blade being flush, so that there is no shoulder or other obstruction from one end of the tool to the other. The screw driver is made with a blade 6 in. long and is designed for use on automobiles, gas engines, electric motors and for general service.

Metal Working Machinery.—Niles-Bement-Pond Company, 111 Broadway, New York City. Four circulars. The first, No. 101, calls attention to a machine for boring both cast-iron and steel wheels ranging from 26 to 42 in. in diameter. The construction of the machine, which is equipped with either belt or motor drive, is described at some length, the text being supplemented by a number of halftone engravings. Special emphasis is laid upon the use of a crane for placing the wheels in position and removing them after they are bored and two engravings depicting its operation are included. Outline drawings showing the amount of floor space required are presented. The next, No. 102, refers to a carwheel lathe equipped with a large central driving gear and pinion of the herringbone type. A number of engravings of the machine are used to supplement the description, one of them having the various features emphasized by brief descriptions set in type around the machine with arrows running to the several parts. Illustrations of the different high-speed steel tools recommended for use with the lathe are included. The third, No. 103, gives a general description and specifications for a side head boring mill for handling work ranging from 36 to 44 in. in diameter. An insert view of the drive is given and the special features of the machine are pointed out by arrows leading from the machine to blocks of text. The last circular, No. 104, is devoted to a heavy 90-in. driving wheel lathe equipped with pneumatic clamping devices, push button control and a special motor for operating the power traverse of the headstock, the various features of the power traverse arrangement being pointed out in a separate engraving.

Air Compressors and Internal Combustion Engines.—Chicago Pneumatic Tool Company, Fisher Building, Chicago, Ill. Booklet No. 224. Illustrates and describes briefly some of the 300 types and sizes of air compressors and internal combustion engines built. The illustrations are miniatures and the description is of necessity very much condensed, the purpose of the booklet being simply to convey at a glance some idea of the extensiveness of the line. References to a list of bulletins describing the various engines and compressors illustrated in complete detail are included.

Wrenches.—Frank Mossberg Company, Attleboro, Mass. Catalog No. 18. Size, 6 x 9 in.; pages, 199. Illustrates and describes briefly a line of wrenches, including adjustable, bicycle, motorcycle, auto socket, marine, engineers' and demountable rim types As an aid to finding any division of the catalog quickly a set of dark spots is printed on the first page of the catalog, which when rolled slightly toward the right will reveal a corresponding spot on the first page of each section. But little text is used in the catalog, the engravings of the different tools and the tables of the sizes in which they can be supplied being relied upon to tell the story. Mention is made of some of the other lines made by this company, which include pliers, metal reels, bells, gongs, steel shop barrels, circular disks and pressed steel automobile parts, etc. Tables giving the shipping weights and standard packages for the various tools listed are included.

Turbo-Undergrate Blower.—B. F. Sturtevant Company, Hyde Park, Boston, Mass. Bulletin No. 1022. Shows some of the plants in which a turbo-undergrate blower has been installed to increase the draft, the exact details of the installation and the work that the blower has done being presented underneath the engraving. Extracts from letters received from owners give additional details about the savings made in other installations and a brief description of the blower is included.

Hammer Bolt Heading Machine.—National Machinery Company, Tiffin, Ohio. Two circulars. The first mentions the outputs that can be secured from the different sizes of a semi-automatic continuous hammer bolt heading machine, which was illustrated in THE IRON AGE, June 3, 1915, while the other circular describes the machine itself. In the first circular the various features of the machine are pointed out, emphasis being placed on the fact that the continuous running of the machine and the automatic movements of starting, gripping and heading result in a marked increase of output. The table of outputs that can be theoretically obtained in 10 hr. contains figures for the three sizes of machine and various arrangements of cam settings. In the other circular an illustration of the machine is presented, followed by a brief set of specifications.

Paint Spraying Equipment.—DeVilbiss Mfg. Company, Toledo, Ohio. Booklet H. Illustrations and descriptive matter explain the operation of the Aeron system of finishing the surfaces of wood and metal products with compressed air as the means of applying the varnish, enamel, lacquer or other finishing material. The apparatus employed consists of a tank about the size of an ordinary paint pail with connections for the compressed air and a spray head. All of the various forms of apparatus are illustrated with tables of the sizes that can be supplied and mention is made of the other apparatus required such as air compressors and receivers and fans for use where the work is done in a closed chamber. The features of the equipment such as ease of adjustment, control, cleaning and refilling are briefly touched upon.

Concrete Inserts and Drills.—Diamond Expansion Bolt Company, 90 West Street, New York City. Bulletins No. 102 and 104. The first describes a hand-operated hammer drill for use in concrete, brick and stone, which was illustrated in THE IRON AGE, Sept. 2, 1915. The special feature about this drill is the use of a spring and a cam on the main axle which provides the power for the blows. Several engravings of the drill in use are presented, together with ones of the bits and expansion bolts used. Mention is also made of special ceiling and floor stands for use with the drill. The other bulletin gives a brief description of two types of inserts for attaching pipe hangers or other supports to concrete ceilings, the principal point of difference between the two being in the type of construction. The description which is presented applies to both types of inserts and is supplemented by engravings of the inserts with a brief mention of the distinguishing features. An illustrated description of these inserts appeared in THE IRON AGE, Sept. 2, 1915.